

THE GARDENERS' GOLDEN TREASURY

INCORPORATING

Sanders' Encyclopaedia of Gardening

The Encyclopaedia of Plant Portraits

The Encyclopaedia of Garden Work & Terms

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SANDERS'
ENCYCLOPAEDIA OF GARDENING

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SANDERS'
ENCYCLOPAEDIA
OF GARDENING
WITH SUPPLEMENT

A DICTIONARY
of cultivated plants, etc., giving in alphabetical sequence the culture and propagation of hardy and half-hardy plants, trees and shrubs, orchids, ferns, fruit, vegetables, hothouse and greenhouse plants, etc., including their specific and common names

REVISED BY A. G. L. HELLYER
F.L.S., Editor of 'Amateur Gardening'

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UNIFORM WITH THIS BOOK

The Encyclopaedia of Garden Work and Terms

The Encyclopaedia of Plant Portraits

The Encyclopaedia of Garden Pests and Diseases

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The first edition of this book by the late T. W. Sanders was published in 1895. Nineteen further editions were published before 1931 when the book was revised and enlarged by A. J. Macself. This twenty-second edition (thirty-second impression), revised by A. G. L. Hellyer, was published in 1962 by W. H. & L. Collingridge Limited, 2-10 Tavistock Street, London, W.C. 2, and in the United States of America by Transatlantic Arts incorporated, Forest Hills, New York. Printed in Great Britain by Robert MacLehose & Company Limited, The University Press, Glasgow. Bound by James Burn & Company Limited, London and Esher

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FOREWORD

SANDERS' *Encyclopaedia of Gardening* first appeared in serial form in *Amateur Gardening*. For five years from November 15th 1890 until August 10th 1895 it appeared, a column or so at a time until at last the work was completed. It was then produced as a book and had an immediate success. For the first time the gardener was provided with a comprehensive encyclopaedia which not only gave brief descriptions of all the plants he was ever likely to meet but also complete information regarding their cultivation. Moreover this encyclopaedia was so compact that it could be carried around easily and so be available as a constant source of reference indoors or out.

Through the years the demand for the encyclopaedia continued unabated. Edition after edition was printed and there were several revisions to keep information up to date. When T. W. Sanders, the original author, died in 1926, responsibility for the encyclopaedia passed to A. J. Macself, who succeeded him as editor of *Amateur Gardening*. The twenty-first edition was prepared under Mr. Macself's supervision. At this time much new matter had to be added on account of the great activity of plant collectors during the preceding twenty or thirty years and the many new plants that had become available as a result.

The war put a stop to all thought of further revision, but in 1946 work began on an entirely new edition. In this I decided to retain the general structure of the Encyclopaedia but to abandon the basis of nomenclature which had been adopted by both Sanders and Macself. Both had worked entirely to the handlists published by the Royal Botanic Gardens, Kew. Unfortunately none of these handlists was right up to date and several were distinctly old. A great deal had been happening in the horticultural world meanwhile, so that the handlists could no longer be regarded as an accurate record even of the opinion of the Kew botanists, let alone of botanists in other parts of the world.

Here a word of explanation on the methods adopted in naming

plants may be of interest to the reader unversed in these matters. The present-day system was founded by Linnaeus and dates from 1753. It is based on the assumption that two names, which may be compared roughly to a surname and a Christian name, will serve to identify any species of plant without possibility of confusion with any other species. The first name denotes the genus to which the plant belongs; the second the particular species within that genus. No name applied to one genus can be used for any other genus. No name applied to one species may be used for another species within the same genus though it may be applied to a species belonging to another genus.

The analogy of Christian and surnames may be used to illustrate this point. Let us suppose that all the Smiths are related and all the Browns are likewise related. No one can be called Smith who does not belong to the family of Smiths; no one can be called Brown who does not belong to the family of Browns. It is also forbidden that there shall be two Smiths with the same Christian name; or, for that matter, two Browns. But there may be Arthur Smiths as well as Arthur Browns, George Smiths as well as George Browns. In these instances there can be no confusion between the two Arthurs or the two Georges for their different surnames serve to distinguish them.

That is the basis of the simple scheme devised by Linnaeus. Latin or Greek names are used in place of English names because these classical languages are common to all countries. The generic name (which we may compare with the hypothetical surname) comes first and the specific name (which we have compared with a Christian name) second.

This binomial system of nomenclature (to give it its official title) was introduced to produce order and stability where formerly there had been chaos and constant change. In the main that is precisely what has been achieved and it is because of these virtues that gardeners as well as botanists have been glad to make use of the system. Popular names serve well enough for popular plants. Everyone knows what is meant by wallflower, forget-me-not and rose so long as these names are used to refer to the common wallflower or forget-me-not and the ordinary garden roses. But suppose it is not the everyday kinds to which one wishes to make reference; that the 'wallflower' is, in fact, that curious little Moroccan species

with flowers of a dull shade of purple which Farrer once described as 'sad and subtle'; or that the forget-me-not is one of the mountain species which are so spare and small and neat by comparison with our leafy woodlander; or that the rose is a wilding newly introduced from Asia? No genuine popular names exist for these. If some must be invented who is to do the inventing and how can it be assured that one name and one name only will be accepted by everyone as the true name of each plant? Of course no such thing can be guaranteed. Even in the case of old and well-established popular names they have often acquired only a local currency.

Yet another difficulty arises in the case of those immense genera, of which *berberis* and *primula* may be cited as examples, which contain hundreds of related yet totally distinct species. All may lay some claim to the popular names barberry and primrose but by what means can one distinguish between one and another? No answer can be given at once so simple and so generally satisfactory as the use of botanical names. These names are ready to hand, they have a precise application and they are relatively stable.

Nevertheless there are occasional changes even in botanical names, and that, from the gardener's standpoint, is the one fly in the ointment. It is, incidentally, one of the reasons why any encyclopaedia of plants must be revised from time to time if it is to be kept up to date and serviceable.

It is not difficult to understand why some name changes may be necessary despite the simplicity and relative stability of the system devised by botanists. It may well happen that, unknown to one another, several different botanists examine and name a new plant. Perhaps they live in different countries and have been supplied with material quite independently. They may come to different conclusions as to the genus to which the newcomer belongs—that is to say as to its precise relationship to other plants already known and named. If they do, the disagreement can only be resolved by further examination of the plant and by general discussion between botanists in all parts of the world. But it is far more likely that they will come independently to the same conclusion regarding genus, but that each will then proceed to supply the new plant with what he regards as a suitable specific name. It is most unlikely that all will think of the same name. So the plant is launched on the world with several different specific names. Which is to have precedence?

Botanists have decided this problem by the very simple expedient of saying that the *first name to be published* is the valid one—always supposing, of course, that there is no good botanical reason for rejecting this name anyway. This is known as the priority rule and it works well enough on the whole. Certainly it would be difficult to think of any better way of dealing with the main problem.

But occasionally a name that is not the first to be published passes into general usage and the name with prior right is overlooked. Only years later does someone discover that Mr. Robinson coined the name *Blancus caeruleus* six months before Mr. Williams named the same plant *Blancus azureus*, the style by which it is commonly known. Under the priority rule Mr. William's name must be declared invalid and Mr. Robinson's accepted as correct.

Gardeners have urged botanists to permit exceptions to this priority rule in certain cases and it is possible that some compromise will be arranged, but it cannot be made retrospective and so many name changes made under this rule must stand.

Other name changes are made necessary by a closer examination or a better understanding of the plants themselves. It may be that a plant which at one time was believed to be closely related to certain other plants and was, therefore, placed in the genus to which they belong, is later found to have its closest affinities elsewhere. In consequence it is transferred to another genus. This means that its name must be changed.

It will be seen from this that if an encyclopaedia based on botanical names is to be of real service it must be kept right up to date and yet must record as synonyms discarded names which are likely still to be in use in gardens. In 1946 there was no one authority to which I could turn for this information. In consequence I decided to use all available authorities and not rely upon one only. This meant that in doubtful cases, where the authorities differed, a decision had to be made as to which might be presumed to have the most accurate information.

In this work of revision and also in checking the all-important cultural notes I sought the help of experts in the various classes of plant. Mr. S. A. Pearce, Assistant Curator at the Royal Botanic Gardens, Kew, undertook the revision of those genera of plants which in this country are mainly grown under glass. Mr. Will Ingwersen dealt with the rock plants; Mr. N. Catchpole made

himself responsible for trees and shrubs; Mr. G. A. Phillips for herbaceous plants; Mrs. Frances Perry for water plants; Mr. A. J. Macself for ferns, and Mr. E. Cooper, who unhappily has since died, for orchids. Annuals were the responsibility of Mr. J. S. Dakers, fruit and vegetables of Miss Doreen Crowther. I also received a great amount of invaluable advice and assistance from Mr. W. T. Stearn, librarian to the Royal Horticultural Society.

In recent years many greenhouse plants, mainly those with ornamental foliage, have become popular as house or room plants. Their success in these circumstances depends on the conditions that can be provided. Most of them prefer a light place in a room with an equable temperature and they resent hot and dry air, draughts and fumes from gas or oil appliances. Although, in ideal conditions, the plants will flourish and grow well, they appreciate being taken into a warm greenhouse, where the atmosphere is a little more humid, for a short period. The general cultural advice given for each plant applies mainly to greenhouse conditions but these hints can also serve as a guide for plants in rooms, although many will be found to succeed in lower temperatures.

Cultural methods have not changed a great deal in the past fifty years but, in one respect at least, an entirely new conception has been introduced. It used to be supposed that, when plants were grown in pots or boxes, it was necessary to vary the soil mixture for them according to the kind of plant under consideration. In consequence recommendations for such mixtures were almost as varied as the recipes in Mrs. Beeton's cookery book. Then in the early 1930's Mr. W. J. C. Lawrence of the John Innes Horticultural Institution demonstrated that it was quite possible to grow a very wide range of totally dissimilar plants in one standard compost, and that this same compost, with slight modifications could, in fact, be made an ideal medium for *all* plants. Since then a great many greenhouse owners have discarded the old individual mixtures in favour of the standardised John Innes recommendations.

In this edition of Sanders' Encyclopaedia the individual mixtures have been retained, for it was considered that many gardeners might still wish to use them in certain instances. The John Innes mixtures may be substituted wherever desired. The basic formula for potting is as follows:

Medium loam (neither too heavy nor too light) - - - - - - 7 parts by bulk

Peat (not too dusty and averaging $\frac{1}{8}$ inch particles) - - - - - - 3 parts by bulk

Sand (coarse and grading up to $\frac{1}{8}$ inch) 2 parts by bulk

A basic fertiliser is prepared separately to the following formula

Hoof and horn meal ($\frac{1}{8}$ inch grist) - 2 parts by weight

Superphosphate of lime - - - 2 parts by weight

Sulphate of potash - - - - 1 part by weight

To prepare the standard John Innes compost used for most greenhouse plants, 4 ounces of this basic fertiliser and $\frac{3}{4}$ ounce ground chalk or limestone are added to each bushel of the loam, peat and sand-mixture. For strong-growing plants more fertiliser and chalk or limestone may be used as the plants reach the larger sizes of pot. The chalk or limestone may be omitted in the case of some lime-hating plants such as heathers and rhododendrons, though it should be observed that the basic amount ($\frac{3}{4}$ ounce per bushel) is so small that it can often be used with benefit even for these plants, especially if the loam or peat is of a rather acid nature.

A variation of this mixture is recommended for seed germination and, in some cases for the boxes or pans in which seedlings are pricked off. The basic soil mixture is as follows:

Medium loam	2 parts	}	quality as for potting compost
Peat	1 part		
Coarse sand	1 part		

To each bushel of this mixture add $1\frac{1}{2}$ ounces superphosphate of lime and $\frac{3}{4}$ ounce ground chalk or limestone.

It is not the purpose of this encyclopaedia to give information regarding the details of garden practice—how to dig, how to graft, how to take cuttings, etc. These practical matters are dealt with in a companion volume *The Encyclopaedia of Garden Work and Terms*. A third volume contains illustrations of many of the plants mentioned in Sanders' *Encyclopaedia of Gardening* and the three volumes together provide a complete library for the gardener.

ENCYCLOPAEDIA

Aaron's Beard, see *Hypericum calycinum*; **-Rod**, see *Verbascum Thapsus*.

Abaca, see *Musa textilis*.

Abele Tree, see *Populus alba*.

Abelia—*Caprifoliaceae*. Slightly tender evergreen and deciduous flowering shrubs. Good maritime subjects, *A. Schumannii* and *A. grandiflora* are the most reliable. First introduced mid-nineteenth century.

CULTURE: Soil, well worked, friable; will grow in chalky loam. Position, warm sheltered wall in full sun. Plant, April or Oct. Prune slightly after flowering.

GREENHOUSE CULTURE: Compost, equal parts loam, peat, leaf-mould and silver sand. Position, well-drained pots in sunny cool house. Pot Oct. Store in cold frame till Jan. Water moderately at first, freely when in full growth, little during winter. Prune straggly growths after flowering. Stand outdoors during summer.

PROPAGATION: By layers in March; cuttings of firm shoots in cold frame in July.

SPECIES CULTIVATED: *A. chinensis* (syn. *A. rupestris*), white, fragrant, Sept., to 6 ft., deciduous, China; *floribunda*, rosy-purple, June, to 6 ft., evergreen, Mexico; *grandiflora*, pink, July-Oct., to 6 ft., semi-evergreen, hybrid; *Schumannii*, pink, Aug., to 5 ft., deciduous, China; *triflora*, cream and pink, June, to 12 ft., deciduous, Himalaya; *uniflora*, pinkish-white, summer, to 6 ft., evergreen, China.

Abeliophyllum—*Oleaceae*. Deciduous shrub of recent introduction, allied to *Fontanesia* and *Forsythia*.

CULTURE: Soil, ordinary, well drained. Position, sheltered, sunny. Prune after flowering.

SPECIES CULTIVATED: *A. distichum*, white in short racemes, February, to 3 ft., Korea.

Abies (Fir)—*Pinaceae*. Hardy coniferous evergreen trees of pyramidal habit. First introduced early seventeenth century.

CULTURE: Soil, sandy loam. Position, cool humid areas with a good depth of soil. Plant Oct. or April. *A. alba*, is a good species to plant in mixed woods as shelter for game. Timber valuable for joists, rafters and floor boards. Grows rapidly after first few years.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy loam in temp. 55° in March, or outdoors in April.

SPECIES CULTIVATED: *A. alba* (syn. *A. pectinata*), 'Silver Fir', 100 to 120 ft., Cent. and S. Europe; *amabilis*, 100 to 250 ft., Br. Columbia; *balsamea*, 'Balsam Fir', 70 to 80 ft., N. America, var. *hudsonia*, 2 ft.; *bracteata*, 100 to 150 ft., California; *cephalonica*, 80 to 100 ft., Greece; *cilicica*, 100 ft., Asia Minor; *concolor*, 80 to 100 ft., Colorado, New Mexico, Arizona, var. *compacta*, low rounded bush, *violacea*, effective glaucous form; *firma*, 120 to 150 ft., Japan; *Forrestii*, newer species, leaves white beneath, W. China; *Fraseri*, 30 to 40 ft., Carolina; *Georgei*, newer species, W. China; *grandis*, 200 to 300 ft., California; *homolepis* (syn. *A. brachyphylla*), 120 ft., Japan; *lasiocarpa*, 'Rocky Mountain Fir', 100 ft., W. America, var. *arizonica*, slow growing, grey foliage; *Lowiana*, 200 ft., Sierra Nevada and Oregon; *magnifica*, 'Red Fir', 200 ft., Vancouver Is. to California; *Mariesii*, 40 to 50 ft., Japan; *Nordmanniana*, 100 to 200 ft., Caucasus; *Pinsapo*, 60 to 100

ft., Spain; and vars. *glauca* and *pendula*; *procera* (syn. *A. nobilis*), 200 ft., California; *sachalinensis*, 130 ft., N. Japan; *spectabilis* (syn. *A. Webbiana*), 80 to 150 ft., Himalaya; *Veitchii*, 50 to 70 ft., Japan. For Douglas Fir see *Pseudotsuga*.

Abobra—*Cucurbitaceae*. Half-hardy climbing, tuberous-rooted, deciduous perennial.

CULTURE: Soil, sandy. Position, south wall. Plant, June; lift tubers Oct. and store in frost-proof place.

PROPAGATION: By seeds sown in leaf-mould, loam and sand, temp. 65°, March, also by division or by cuttings in spring.

SPECIES CULTIVATED: *A. tenuifolia* (syn. *A. viridiflora*), 'Cranberry Gourd', green, fragrant, summer, fruit egg-shaped, scarlet, 6 ft., S. America.

Abroma—*Sterculiaceae*. Stove-flowering evergreen plants. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam, peat, sand. Pot and prune, March. Water freely in summer, moderately in winter. Temp., March to Sept. 70° to 80°; Sept. to March 60° to 65°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep, or cuttings of firm shoots, in fine sandy soil, March, temp. 65° to 75°.

SPECIES CULTIVATED: *A. augusta*, purple, Aug., 8 to 10 ft., Asia.

Abronia (Sand Verbena)—*Nyctaginaceae*. Half-hardy trailing plants with fragrant flowers. First introduced early nineteenth century.

CULTURE: Soil, sandy loam. Position, sunny rockery or elevated warm border. Plant, June.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil, temp. 55° to 65°, March; perennials by cuttings of young shoots in similar soil and temp.

SPECIES CULTIVATED: *A. Bigelowii*, white, July, 6 to 12 in.; *A. latifolia* (syn. *A. arenaria*), lemon-yellow, July, 9 to 18 in., California; *umbellata*, rosy-pink, June and July, 6 to 18 in., California.

Abrus—*Leguminosae*. Stove deciduous climber. First introduced mid-seventeenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Pot and prune March. Water freely spring and summer, moderately in autumn and winter. Temp., March to Sept. 70° to 80°; Sept. to March 60° to 65°.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep, or cuttings of firm shoots in sandy loam, temp. 75° to 85°, Feb.

SPECIES CULTIVATED: *A. precatorius*, 'Rosary Pea', 'Weather Plant', pale purple, May, 9 to 12 ft. Seeds scarlet and black, used as beads for rosaries, Tropics.

Absinthium, see *Artemisia Absinthium*.

Abutilon—*Malvaceae*. Greenhouse and half-hardy herbs and shrubs.

CULTURE: Compost, two parts loam, one peat and sand. Position, sunny greenhouse. Pot and prune, March. Temp., March to Sept. 55° to 65°; Sept. to March 50° to 55°. Water freely in spring and summer, moderately in autumn and winter. May be used for summer bedding. *A. megapotamicum* is a tender climbing species for wall or greenhouse and *A. vitifolium* is hardy in the open in mild districts.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in cold house or frame in March, grow young plants in pots until finally planted; cuttings in sandy soil in March. Temp. 70°.

SPECIES CULTIVATED: *A. insigne*, white and carmine, Jan., 5 ft., Colombia; *hybridum*, various colours, leaves spotted, most of the garden forms belong here; *megapotamicum* (syn. *A. vexillarium*), yellow and scarlet, summer, 4 to 8 ft., Brazil; *striatum*, orange-red, all year round in greenhouse, 6 to 10 ft., Brazil; *vitifolium*, blue, mauve, shading to white, grey downy vine-like leaves, 10 to 25 ft., sometimes short-lived, Chile.

Abyssinian Banana, see *Musa Ensete*; - **Primrose**, see *Primula verticillata*.

Acacallis—*Orchidaceae*. A beautiful monotypic epiphyte. Dwarf growing, the pseudo-bulbs set at short intervals on the rhizome, flowers 1 to 2 in. across.

CULTURE: Never less than 70° F. Requires a moist atmosphere. Should be placed on a raft, the surface of which is covered with a thin layer of fibre and sphagnum moss. Enjoys frequent spraying rather than heavy watering. Shading required.

PROPAGATION: The rhizome branches and side shoots with not less than two pseudo-bulbs and a growth may be placed on separate rafts.

SPECIES CULTIVATED: *A. cyanea* (syn. *Aganisia caerulea*), light bluish, summer, 1 ft., Brazil.

Acacia (Wattle; Gum Tree)—*Leguminosae* (or *Mimosaceae*). Greenhouse evergreen flowering shrubs or small trees. First introduced mid-seventeenth century.

CULTURE: Compost, equal parts peat, loam, sand. Pot and prune, Feb. or March. Water freely in spring and summer, moderately in autumn and winter. Temp., March to Sept. 55° to 65°; Sept. to March 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep, March, or cuttings of half-ripened shoots, in sandy peat, well-drained pots, under close frame, June to July.

SPECIES CULTIVATED: *A. alata*, yellow, winter, Australia; *armata*, 'Kangaroo Thorn', yellow, spring, 6 to 10 ft., Australia; *Baileyana*, yellow, late winter, 15 to 20 ft., Australia; *calamifolia*, 'Broom Wattle', Australia; *cordata*, yellow, spring, 12 to 18 in., Australia; *cultriformis*, yellow, early spring, 6 to 8 ft., Australia; *cyanophylla*, 'Blue-leaved Wattle', golden yellow, early spring, 18 ft., Australia; *decurrens*, 'Green Wattle', yellow, early spring, 50 ft., Australia, var. *dealbata*, 'Silver Wattle', 'Mimosa'; *Drummondii*, yellow, April, 10 ft., Australia; *Farnesiana*, 'Popinac', 'Cassie', deep yellow, July, 6 to 10 ft., Tropics; *hastulata*, yellow, spring, Australia; *juniperina*, yellow, late spring and early summer, 8 to 12 ft., Australia; *leprosa*, primrose, April, 6 to 10 ft., Australia; *lineata*, yellow, spring, 6 ft., Australia; *longifolia* 'Sydney Golden Wattle', yellow, March, 10 to 15 ft., Australia, var. *floribunda*, whitish yellow, early spring, a very distinct type; *melanoxylon*, 'Blackwood Acacia', cream, early spring, evergreen, 20 to 30 ft., Australia; *myrtifolia*, yellow, spring, Australia; *neriifolia*, yellow, spring, 15 to 20 ft., Australia; *pendula*, 'Weeping Myall', grey foliage, pendulous branches, 15 to 20 ft., Australia; *pubescens*, yellow, April, 6 to 12 ft., Australia; *pulchella*, yellow, March, 3 to 6 ft., Australia; *pycnantha*, 'Golden Wattle', yellow, early spring, 15 to 20 ft., Australia; *Riceana*, yellow, May, 20 ft., Tasmania; *saligna*, yellow, spring, Australia; *verticillata*, yellow, March, 6 to 20 ft., Australia. See also the genera *Albizia* and *Robinia*.

Acaena—*Rosaceae*. Hardy trailing, low-growing, evergreen perennials. First introduced early nineteenth century.

CULTURE: Soil, sandy loam. Position, open or semi-shaded rock garden, rough banks or in paving. Plant, October to April. They are good, rapid ground coverers and excellent for planting between paving stones. Too invasive for choice neighbours. Ornamental foliage and burrs.

PROPAGATION: By seeds sown in spring; cuttings in cold frames in late summer; division of roots in spring or autumn. All in light, sandy soil.

SPECIES CULTIVATED: *A. adscendens*, purple, summer, Patagonia and N. Zealand; *argentea*, metallic bronze foliage, red burrs, Chile; *Buchananii*, silvery-green foliage, red burrs, N. Zealand; *caesiglauc* (syn. *A. glauca*, *A. Sanguisorbae caesiglauc*), blue-grey foliage, N. Zealand; *glabra*, smooth, shining foliage, N. Zealand; *laevigata*, strong, distinct, almost shrubby, glaucous, Magellan; *microphylla*, crimson burrs, N. Zealand, var. *inermis*, khaki-coloured loose mats, N. Zealand; *myriophylla*, green, feathery foliage, densely tufted, Argentine and Chile; *novae-zelandiae*, 'New Zealand Burr', trailing, bronze foliage, red-purple burrs, N. Zealand; *Sanguisorbae*, large, silky leaves, rounded purple burrs; *sericea*, greenish, Mexico; *splendens*, hairy foliage, Chile.

Acalypha—(Copper-leaf)—*Euphorbiaceae*. Stove evergreen foliage plants with attractive foliage. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts leaf-mould, peat, loam, sand. Pot and prune, Feb. or March. Water freely in spring and summer, moderately in autumn and winter. Temp., March to Sept. 70° to 80°; Sept. to March 60° to 65°. Suitable for summer or sub-tropical bedding.

PROPAGATION: By cuttings in sandy soil, temp. 80°, Feb. or March.

SPECIES CULTIVATED: *A. capillipes*, Australia; *fruticosa*, old world tropics; *hispida* (syn. *A. Sanderi*), 'Red-hot Cat-tail', 'Chenille Plant', 6 to 10 ft., New Guinea; *Godseffiana*, 1 to 3 ft., New Guinea; *Wilkesiana* (syns. *A. illustris* and *A. tricolor*), 3 to 4 ft., Fiji, and vars. *Macafeana*, *macrophylla*, *marginata*, *musaica*, *obovata* and *triumphans*.

Acampe—*Orchidaceae*. Epiphytes distributed in India, Burma, Africa, allied to Vanda, with usually hard stems and leaves. Met with in cultivation; of little value. Flowers small, fleshy, often somewhat clustered on short peduncles.

CULTURE: As for Vanda.

PROPAGATION: As for Vanda. Can seldom be effected.

SPECIES CULTIVATED: The most attractive are *A. multiflora*, 12 in., yellow, red dotted, in branched panicles, autumn, China, India; *papillosa*, 12 in. yellow, red marked, lip whitish with small excrescences, fragrant, India.

Acantholimon (Prickly Thrift)—*Plumbaginaceae*. Evergreen hardy perennials. A very large genus mostly of handsome and ornamental rock garden plants. Few of them are in cultivation. First introduced mid-nineteenth century.

CULTURE: Soil, sandy loam. Position, full sun, rock garden or a warm wall. Plant, October to April but preferably the latter.

PROPAGATION: By cuttings in a cold frame in late summer and autumn or by seeds.

SPECIES CULTIVATED: *A. acerosum*, rose, July to Aug., 6 in., Asia Minor; *Echinus* (syn. *A. androsaceum*), pink, July to Aug., 6 in., Orient; *glumaceum*, rose, July, 6 to 9 in., Armenia, the easiest and commonest; *venustum*, deep pink, summer, 9 in., Asia Minor.

Acanthopanax—*Araliaceae*. Hardy ornamental-leaved deciduous shrubs formerly included in the genus *Aralia*. Ivy-like fruits and usually prickly stems.

CULTURE: Soil, rich, well-drained loam. Position, warm, sheltered shrubberies, or corners of lawns. Plant in Sept. or April.

PROPAGATION: By seeds sown in heat in spring; cuttings of ripened shoots in autumn; suckers at any time.

SPECIES CULTIVATED: *A. Henryi*, 8 ft., finely toothed foliage, Central China; *Sieboldianus* (syn. *A. pentaphyllus*), 8 ft., elegant foliage, Japan, var. *variegatus*, leaves edged creamy white; *sessiliflorus*, 6 ft., leaves wrinkled, large, Japan; *Simonii*, 4 ft., attractive compound leaves, yellow spines, China. For *A. ricinifolius* see *Kalopanax pictus*.

Acanthophoenix (Prickly Date Palm)—*Palmae*. Stove evergreen palms. First introduced mid-nineteenth century.

CULTURE: Compost, two parts peat, one part loam and sand. Repot, Feb. Water freely in summer, moderately other times. Temp., March to Sept. 70° to 85°; Sept. to March 60° to 65°.

PROPAGATION: By seeds sown 1 in. deep in light soil. Temp. 80°, Feb. or March.

SPECIES CULTIVATED: *A. crinita*, 6 to 10 ft., Mauritius, Bourbon; *rubra*, 6 to 12 ft., Madagascar.

Acanthophyllum, see *Dianthus Noeanus*.

Acanthorrhiza—*Palmae*. Evergreen stove palms. First introduced mid-nineteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Repot,

Feb. Water moderately in summer, very little other times. Temp., March to Sept. 70° to 85°; Sept. to March 60° to 65°.

PROPAGATION: Like *Acanthophoenix*.

SPECIES CULTIVATED: *A. aculeata*, Central America; *Warscewiczii*, Panama.

Acanthus (Bear's Breech)—*Acanthaceae*. Hardy herbaceous perennial with ornamental foliage. First introduced mid-sixteenth century.

CULTURE: Soil, sandy loam. Position, warm sheltered border. Plant, Oct., March or April.

PROPAGATION: By root cuttings; seed in light soil; division of roots in Oct. or March.

SPECIES CULTIVATED: *A. Caroli-Alexandri*, white or rose, July, leaves spiny, 1 to 1½ ft., Greece; *longifolius*, purple, June, 3 to 4 ft., Dalmatia; *mollis*, white, rose, lilac, 3 to 4 ft., S. Europe, var. *latifolius*, larger and hardier form; *montanus*, tender, rosy-white, Aug., leaves spiny, 3 ft., West Africa; *Perringii*, rose, June, leaves spiny, 1 to 1½ ft., Turkey; *spinosus*, purple, July, leaves spiny, 3 to 4 ft., Levant.

Acer (Maple)—*Aceraceae*. A large genus of hardy ornamental trees, for the most part deciduous but including a few shrubby species, notably the Japanese Maple, *A. palmatum* and its varieties. All have typical winged fruits (samarae). The majority have five-lobed, palmate leaves which assume attractive autumn tints.

CULTURE: Soil, well-drained loam. Position, shrubberies or open spaces; Japanese kinds in warm borders or in pots in cool greenhouse. Plant, Oct. to March.

PROPAGATION: By seeds sown ¼ in. deep in sheltered position Oct.; grafting March; budding Aug. for choice Japanese and variegated kinds; layering Oct.

USEFUL DATA: Common Maple (*Acer campestre*) will grow to an altitude of 1,200 ft. and the Sycamore (*Acer Pseudo-Platanus*) to 1,500 ft. above sea level. Timber reaches maturity at 40 years of age. Life of trees 500 to 700 years. Timber of Sycamore used for making pattern moulds, stair-rails, turnery, etc.; that of common species and Sugar or Bird's Eye Maple (*A. saccharum*) for cabinet work. Quantity of Maple seeds required to plant an acre of ground, 14 lbs.; Sycamore, 30 lbs. Sycamore the best for hilly exposed positions.

SPECIES CULTIVATED: *A. argutum*, to 25 ft., Japan; *campestre*, 'Common Maple', to 50 ft., Britain, var. *variegatum*, leaves white and yellow, 20 ft.; *capillipes*, 35 ft., marbled bark, Japan; *carpinifolium*, 50 ft., Japan; *circinatum*, leaves scarlet in autumn, 5 ft., N.W. America; *Ginnala*, 10 to 15 ft., China, Japan, Manchuria; *griseum*, 40 ft., dark-coloured peeling bark revealing orange younger layers beneath, magnificent autumn tints, China; *Henryi*, 30 ft., spring and summer, tinted foliage, bluish-green stems, China; *Hersii*, newer species, striated bark, China; *japonicum*, 20 ft., Japan, and its vars. *aureum*, golden-leaved, and *laciniatum*, finely-cut leaves; *Maximowiczii*, handsome, newly-introduced small tree with striated bark, China; *Mono* (syn. *A. pictum*), 60 ft., Japan; *Negundo*, 'Box Elder', 40 to 70 ft., N. America, and vars. *californicum*, more vigorous, *crispum*, curled leaves, *laciniatum*, finely-cut leaves, *variegatum*, silvery leaves; *nigrum*, 'Black Maple', dark bark and orange twigs, N. America; *nikoense*, 40 ft., slow-growing, intense autumn colouring, Japan; *orientale* (syn. *A. creticum*), semi-evergreen, 10 to 15 ft., Medit. region; *palmatum*, 10 to 20 ft., Japan, and vars. *aureum*, *atropurpureum*, *septemlobum elegans*, *dissectum*, and *roseo-marginatum*; *pensylvanicum*, 'Snake Bark Maple', 30 ft., white-striated stems, N. America; *platanoides*, 'Norway Maple', 50 ft., Europe, and its vars. *aureo-variegatum*, *laciniatum*, *rubrum*, *Schwedleri*; *Pseudo-Platanus*, 'Sycamore', 100 ft., Central Europe, and vars. *albo-variegatum*, *brilliantissimum*, *corstorphinense*, *Leopoldii*, slow-growing and suitable for small gardens, *Handjeryi*, very slow-growing, *Worleei*, foliage rich yellow; *rubrum*, 'Red Maple', 80 to 100 ft., scarlet flowers, Canada; *saccharum*, 'Sugar Maple', 100 ft., maple sugar is produced from sap of this tree, N. America, var. *monumentale*, narrow erect growth; *spicatum*, 'Mountain Maple', pink fruits, brilliant autumn tints, N. America, var. *multiserratum*,

attractive heart-shaped leaves; *tataricum*, 20 to 30 ft., S.E. Europe, Asia Minor; *truncatum*, 25 ft., attractive palmate leaves, China; *velutinum*, 50 ft., Caucasus N. Persia, and var. *Van-Volxemii*, vigorous tree with large palmate leaves, glaucous on the underside.

Aceranthus, see *Epimedium*.

Acceras (Green Man Orchis)—*Orchidaceae*. Hardy terrestrial, tuberous-rooted orchid.

CULTURE: Soil, chalky loam. Position, open and dry. Plant, Oct. to March.

PROPAGATION: By division of tubers Oct. or March.

SPECIES CULTIVATED: *A. anthropophora*, green, June, 6 to 10 in., Britain.

Achillea (Yarrow)—*Compositae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary. Position, dwarf species on rockery, tall ones in open borders. Plant Oct. to April.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep; division of roots in autumn or spring.

SPECIES CULTIVATED: *A. ageratifolia*, close mounds, silvery leaves and stems, white, July to Aug., Greece, and var. *Aizoon* (syn. *Anthemis Aizoon*); *Ageratum*, 'Sweet Maudlin', white, summer, 6 in., Greece; *ambigua*, silvery hummocks, white fls., June, 4 in.; *atrata*, white, Aug., 6 in., Austria; *Clavennae*, white, summer, 6 in., Austria; *clypeolata*, white-tomentose, yellow, 12 in., summer, Balkans; *filipendulina* (syn. *A. Eupatorium*), yellow, June to Sept., 4 ft., Caucasus; *Herba-rotta*, neat, aromatic rock plant, white, May to June, C. Europe; *Huteri*, dwarf silvery-leaved alpine, white, May to June, Switzerland; *Jabornegii*, white, summer, 6 in., hybrid; *Kellereri*, filigreed silver leaves, white, summer, 6 in., hybrid; *Kolbiana*, white, 4 in., summer, hybrid; *Lewisii*, creamy yellow, 4 in., summer, hybrid; *Millefolium*, 'Milfoil', white, summer, 1 to 3 ft., Britain, var. *rosea*, rose; *Ptarmica*, 'Sneezewort', white, 2 ft., summer, Britain; *Prichardii*, white, semi-double, 4 in., summer, hybrid; *rupestris*, white, May, 3 in., Italy; *serbica*, silvery stems and foliage, May to Aug., 1 ft., Balkans; *sibirica* (syn. *A. mongolica*), narrow leaves, large white flower heads on long stems, to 3 ft., Mongolia; *tomentosa*, yellow, summer, 8 to 12 in., Europe; *umbellata*, white, June, 4 in., Greece; *Wilczekiana*, silver-serrated leaves, white, summer, 9 in., hybrid.

Achimenes—*Gesneriaceae*. Greenhouse, tuberous-rooted, deciduous perennials. First introduced mid-eighteenth century.

CULTURE: Compost, two parts peat and loam, one part leaf-mould, and sand. Pot in Feb., 1 in. apart, 2 in. deep, in pots, pans, or baskets. Water moderately at first, freely when in growth. After flowering, gradually withhold water from roots, and when foliage dies place pots on their sides in greenhouse, letting them remain till Feb.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil, temp. 70° to 80°, March; cuttings of young shoots and leaves April; division of scaly rhizomes, Feb.

SPECIES CULTIVATED: *A. coccinea*, scarlet, Aug., 1 ft., W. Indies; *grandiflora*, crimson, Oct., 18 in., Mexico; *heterophylla*, scarlet, July, 1 ft., Brazil; *longiflora*, violet, Aug., 1 ft., Mexico, and vars. *alba* and *major*; *patens*, violet, June, 1 ft., Mexico. A number of hybrids and varieties will be found in trade lists.

Achlys—*Berberidaceae*. Hardy herbaceous perennials.

CULTURE: Soil, cool, preferably lime-free, half shade.

PROPAGATION: Seeds or division of old plants in spring.

SPECIES CULTIVATED: *A. triphylla*, flowers inconspicuous, leaves fragrant when dried, 12 in., Western U.S.A.

Achras—*Sapotaceae*. Evergreen trees grown in tropical America for their edible fruits. Sometimes known as *Calocarpum*. First introduced early eighteenth century.

CULTURE: Soil, rich loamy. Position, border in warm greenhouse. Temp., March to Sept. 75° to 90°; Sept. to March 65° to 70°.

PROPAGATION: By seeds; cuttings.

SPECIES CULTIVATED: *A. Zapota*, 'Sapote', 'Marmalade Plum', fruits russet-brown, to 65 ft., Cent. America.

Acidantha—*Iridaceae*. Tender bulbous plants. First introduced late nineteenth century.

CULTURE: Compost, equal parts sandy loam and leaf-mould. Position, pots in cool greenhouse for *A. bicolor*, warm house for other species. Water freely during growing period, little at other times.

PROPAGATION: By offsets treated as advised for bulbs.

SPECIES CULTIVATED: *A. aequinoctialis*, white and crimson, Nov., 1½ ft., Sierra Leone; *bicolor*, white and purple, 1 to 1½ ft., Abyssinia, var. *Murieliae* (syn. *Gladiolus Murieliae*), white, blotched crimson, fragrant, 3 ft., July, Abyssinia; *candida*, white, 1 to 1½ ft., E. Trop. Africa.

Acineta—*Orchidaceae*. An epiphytic genus of considerable attraction. Pseudobulbs stout with large leaves. Flowers many in long pendent spikes, from base of pseudobulb, usually subglobose, fairly large, often fragrant.

CULTURE: Compost as for *Cattleya* with a little loam fibre added. Baskets are necessary and drainage must allow passage for the spikes. Hang near the glass, winter temp. 60° to 65°. Mature the plants in autumn by exposing to light. If ripened, water may not be required in winter. Moisture then must not be allowed to lodge on the plants or black spot may result.

PROPAGATION: By division of plants large enough.

SPECIES CULTIVATED: *A. Barkeri*, yellow or crimson marked, summer, Mexico; *chrysantha*, yellow, tip whitish, summer, Mexico; *densa* (syn. *A. erythroxantha*), yellow, crimson-spotted, spring, America; *Hrubyana*, ivory white, purple-spotted, summer, Colombia; *superba* (syn. *A. Humboldtii*), purplish crimson, lip marked yellow, spring, Colombia.

Aciphylla (Spear-grass)—*Umbelliferae*. Hardy evergreen perennials forming handsome rosettes of spiny foliage. First introduced mid-nineteenth century.

CULTURE: Soil, sandy loam. Position, large open rock gardens and beds. Plant, Oct., March or April.

PROPAGATION: By seeds sown ¼ in. deep in pans in cold frame, or warm position outdoors April; division of roots March.

SPECIES CULTIVATED: *A. Colensoi*, white, summer, 4 to 6 ft. in Britain, 8 to 9 ft. in native haunts, N.Z.; *Lyallii*, 2 ft., sometimes more, N.Z.; *squarrosa*, 'Bayonet Plant', white, summer, 4 to 6 ft., N.Z.

Acokanthera—*Apocynaceae*. Greenhouse evergreen flowering shrubs. Juices of both species are very poisonous. *A. spectabilis* was formerly known as *Toxicophloeaspectabilis*. First introduced late eighteenth century.

CULTURE: Compost, two parts light loam, one part leaf-mould, and well-decayed manure, one part sand. Position, well-drained pots or border in light part of greenhouse. Water freely March to Sept., sparingly Sept. to March. Temp., March to Sept. 60° to 70°; Sept. to March 45° to 55°.

PROPAGATION: By cuttings of young shoots in April and May, under bell-glass in gentle bottom heat.

SPECIES CULTIVATED: *A. spectabilis*, 'Winter Sweet', white, fragrant, spring, 8 to 10 ft., S. Africa; *venenata*, 'Bushman's Poison', white, fragrant, 6 to 7 ft., S. Africa.

Aconitum (Aconite)—*Ranunculaceae*. Hardy herbaceous perennials, containing violent poisons. The flowers are hooded and foliage delphinium-like.

CULTURE: Soil, ordinary. Position, partly shaded borders. *A. uncinatum* is suitable for growing on pillars, arbours, etc. Plant, Oct. to March.

PROPAGATION: By division of roots in autumn or spring; seed.

SPECIES CULTIVATED: *A. anglicum*, mauve-blue, May to June, 3 ft., Britain; *Anthora*, yellow, July, 2 to 4 ft., Pyrenees; *Cammarum* (syn. *A. intromedium*, *A. Stoerckianum*), purple, July to Sept., 4 ft., hybrid, var. *bicolor* (syn. *A. bicolor*), purple and white, Europe; *Carmichaelii*, purple-blue, autumn, 4 ft., China, var.

Wilsonii, 6 ft.; *Fischeri*, bluish-lilac, July to Oct., variable, Asia; *japonicum*, deep violet, Sept. to Oct., 3 ft., Japan; *Lycotomum*, 'Monkshood', yellow, July to Sept., 3 to 4 ft., Europe, Siberia; *Napellus*, blue, July to Sept., 4 to 6 ft., very poisonous, Europe, var. *album*, white, *carneum*, flesh-colour, *pyramidale*, late flowering, and *roseum*, pink; *uncinatum* (syn. *A. volubile*), dark blue, autumn, 5 to 8 ft., partly climbing, N. America; *variegatum*, blue, and white, July to Aug., 3 to 5 ft., Europe.

Acorus—*Araceae*. Hardy aquatics. *A. Calamus* is fragrant in all its parts. Introduced by Gerard in 1596 and naturalised in Norfolk by 1660.

CULTURE: Heavy loamy soil. Position, margins of ponds; *A. gramineus* var. *pusillus* may be grown in aquariums. Plant March to July.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *A. Calamus*, 'Sweet Flag', 3 ft., foliage resembling a flag iris, N. Temp. Regions, var. *variegatus*, leaves striped cream and green, 2 ft.; *gramineus*, 12 in., grassy, Japan, vars. *pusillus*, 3 in., *variegatus*, 12 in., leaves variegated.

Acroclinium, see *Helipterum*.

Acrophorus, see *Davallia*.

Acrophyllum—*Cunoniaceae*. Greenhouse flowering shrub. Evergreen. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat and loam, little sand. Pot and prune, Feb. Water freely spring and summer, moderately other times. Temp., March to Sept. 55° to 60°; Sept. to March 45° to 50°.

PROPAGATION: By cuttings of firm shoots in sandy peat under bell-glass in a cool house in summer.

SPECIES CULTIVATED: *A. venosum*, pink, May, 6 ft., Australia.

Acrostichum—*Polypodiaceae*. Stove evergreen ferns found in tropical swamps.

CULTURE: Compost, equal parts peat, loam and leaf-mould, sand and charcoal. Pot Feb. or March. Water freely spring and summer, moderately other times. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 65°.

PROPAGATION: By division of roots at potting time or by spores in spring.

SPECIES CULTIVATED: *A. aureum*, 1 to 2 ft., increasing greatly with age, Tropics; *daneaeifolium* (syn. *A. excelsum*), fronds erect 5 ft. and over, Tropics.

Actaea (Baneberry)—*Ranunculaceae*. Hardy herbaceous perennials with poisonous red, white or black berries.

CULTURE: Soil, ordinary. Position, sunny border. Plant, Oct. or March.

PROPAGATION: By seeds sown outdoors in April; division of roots in March.

SPECIES CULTIVATED: *A. alba* (syn. *A. pachypoda*), white, May, berries white, 12 to 18 in., N. America; *rubra*, white, berries red, N. America; *spicata*, 'Herb Christopher', white, May, black berries, 1 ft., Britain, var. *arguta*, taller form.

Actinea—*Compositae*. Hardy herbaceous perennials, sometimes known as *Actinella*.

CULTURE: Soil, light sandy. Position, rockery or open sunny border. Plant, Oct. or March.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *A. acaulis*, fls. rayless yellow buttons, May to June, 9 to 12 in., U.S.A.; *grandiflora*, 'Pygmy' or 'Dwarf Sun Flower', yellow, summer, 6 in., Rocky Mountains; *odorata*, yellow, July to Sept., 9 in. fragrant; *scaposa*, yellow, July to Sept., foliage silvery, 9 in., N. America.

Actinella, see *Actinea*.

Actinidia—*Actinidiaceae* (or *Dilleniaceae*). Hardy, deciduous and mostly rampant climbing, self-supporting shrubs. Flowers frequently unisexual. Fruit an insipid, gooseberry-like berry. All species from E. Asia. *A. chinensis* is the best species for gardens.

CULTURE: Soil, ordinary. Position, wall, trellis or tree stump. Plant, Oct. to March.

PROPAGATION: By seeds sown in pots in cold frame, April; layering shoots in Nov.; cuttings of half-ripened shoots in close frame.

SPECIES CULTIVATED: *A. arguta*, very vigorous, reaching the tops of tall trees, cream-coloured fragrant flowers, yellow berries; *chinensis*, vigorous, growths and fruit covered with reddish hairs; *Kolomikta*, 6 ft., foliage variegated white and pink; *polygama*, 10 ft., silver-variegated; *purpurea*, sweet-flavoured purple berries, vigorous; *rubricaulis*, red-stemmed newer species from W. China.

Actiniopteris—*Polypodiaceae*. Stove and greenhouse evergreen ferns.

CULTURE: Compost, equal parts peat, loam, charcoal, potsherds, and silver sand. Pot, Feb. or March. Good drainage and clean pots essential. Water moderately all seasons and keep atmosphere moist. Temp., March to Sept. 70° to 80°; Sept. to March 60° to 70° for *A. australis*.

PROPAGATION: By spores as for *Adiantum*.

SPECIES CULTIVATED: *A. australis* (syn. *A. radiata*), 3 in., India, requires stove treatment.

Actinomeris—*Compositae*. Hardy herbaceous perennial. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, open border. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors April; division of roots March.

SPECIES CULTIVATED: *A. alternifolia* (syn. *A. squarrosa*), 'North American Sunflower', yellow, July, 3 ft., N. America, var. *procera*, taller form.

Actinotus—*Umbelliferae*. Greenhouse or half-hardy herbaceous perennial.

INDOOR CULTURE: Compost, equal parts loam and peat, with a liberal addition of silver sand. Position, sunny part of cool greenhouse. Pot, March or April. Water freely March to Oct.; moderately afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

OUTDOOR CULTURE: Soil, ordinary. Position, sunny. Sow seeds in temp. of 65° in March or April. Harden off seedlings gradually, and plant out at the end of May.

PROPAGATION: By seeds sown in a temp. of 65° in spring; or by division of the roots at potting time.

SPECIES CULTIVATED: *A. Helianthi*, 'Flannel Flower', white, June, 2 ft., Australia.

Ada—*Orchidaceae*. Epiphytic genus allied to *Odontoglossum* and succeeds best when grown in the *Odontoglossum* house. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat or fibre and sphagnum moss. Position, pots in shade. Repot when new growth begins. Water freely during season of growth, moderately afterwards. Resting period, none. Temp., March to Sept. 55° to 60°; Sept. to March 50° night, 55° day.

PROPAGATION: By division of plant at potting time.

SPECIES CULTIVATED: *A. aurantiaca*, orange, Jan., 1 ft., Colombia; *Lehmanni*, cinnabar-orange, lip whitish, early summer, leaves grey-marked, Colombia.

× **Adaglossum**—*Orchidaceae*. A bigeneric hybrid between *Ada* and *Odontoglossum*.

Adam's Needle, see *Yucca filamentosa*.

Adder's Fern, see *Polypodium vulgare*; **-Tongue Fern**, see *Ophioglossum vulgatum*;

-Violet, see *Goodyera pubescens*.

Adenandra—*Rutaceae*. Greenhouse, evergreen flowering shrubs. First introduced early eighteenth century.

CULTURE: Compost, equal parts loam, peat and sand. Pot, March. Water

moderately Sept. to April, freely afterwards. Temp., Sept. to March 50° to 55°; March to Sept. 55° to 65°.

PROPAGATION: By cuttings of young shoots in sandy peat under bell-glass, March; also by seeds sown in similar soil at any time.

SPECIES CULTIVATED: *A. amoena*, red, June, 2 ft.; *fragrans*, 'Breath of Heaven' (syn. *Diosma fragrans*), pink, June, 2 ft., S. Africa; *coriacea*, pink, June, 18 in., S. Africa; *marginata*, flesh, June, 18 in., S. Africa; *umbellata*, pink, June, 2 ft., S. Africa; *uniflora* (syn. *Diosma uniflora*), white and pink, June, 18 in., S. Africa.

Adenanthera—*Leguminosae* (or *Mimosaceae*). Stove, evergreen flowering shrubs allied to Mimosa. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts peat and loam, with a little silver sand. Position, well-drained pots in light part of stove. Pot, March. Water freely in spring and summer, and moderately in autumn and winter. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

PROPAGATION: By cuttings of side shoots removed with a base of old wood and inserted in sand under bell-glass in spring.

SPECIES CULTIVATED: *A. bicolor*, yellow, July, Ceylon; *pavonina*, 'Red Sandalwood Tree', 'Peacock Flower-Fence', yellow and white, July, 5 ft., China.

Adenocarpus—*Leguminosae*. Deciduous or semi-evergreen shrubs or small trees.

CULTURE: Soil, loam, peat and sand. Position, front of sheltered shrubberies. Short-lived, so young plants should be raised for replacement.

PROPAGATION: By seeds; cuttings of green wood; layers.

SPECIES CULTIVATED: *A. complicatus*, yellow, May, dense shrub, to 3 ft., S. Europe; *decorticans*, golden yellow in short dense upright racemes, May to June, 20 ft., Spain; *foliosus*, yellow, May, 4 to 6 ft., Canary Islands.

Adenophora (Gland Bell-flower)—*Campanulaceae*. Hardy perennials. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, sunny, well-drained border, rock garden for shorter species. Plant, Oct. or March.

PROPAGATION: By seeds sown in March, in pots or pans in cold frame; division in spring.

SPECIES CULTIVATED: *A. coelestis*, pale blue, July, 1 to 2 ft., W. China; *confusa*, pale blue, summer, 18 in., W. China; *coronopifolia*, summer, pale blue, 2 to 3 ft., Manchuria; *Lamarckii*, blue, June, 1 to 2 ft., Transylvania; *latifolia*, blue, July, 18 in., Siberia; *lilifolia*, whitish blue, fragrant, Aug., 18 in., Europe; *hakusanensis*, blue, July, 18 in., Japan; *polymorpha*, pale blue, Aug., 1½ to 3 ft., E. Asia; *Potaninii*, pale blue, Aug., 2 ft., Turkistan; *stylosa*, blue, May, 1 ft., Asia; *tricuspidata* (syn. *A. denticulata*), blue, July, 18 in., China; *verticillata*, blue, June, 2 to 3 ft., Japan.

Adiantum (Maidenhair Fern)—*Polypodiaceae*. Stove, greenhouse and hardy ferns.

CULTURE: Compost, two parts peat, one part loam, silver sand, charcoal. Pot, March. Water moderately Sept. to March, freely afterwards. Position, shady at all times. Plant hardy species in April in equal parts peat and loam, in shady position. Temp. stove species, Sept. to March 60° to 70°, March to Sept. 70° to 80°; greenhouse species, Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By spores sown on fine sandy peat, kept moist and shaded under bell-glass.

STOVE SPECIES CULTIVATED: *A. caudatum*, 6 to 12 in., Tropics; *cuneatum* (syn. *A. aemulum*), 8 to 12 in., Brazil; *concinnum*, 12 to 18 in., Mexico to Brazil; *cristatum*, 1½ to 3 ft., W. Indies; *curvatum*, fronds forked, Brazil; *decorum*, 8 to 12 in., Peru; *lunulatum*, fronds 1 ft. long rooting at apex, Tropics; *macrophyllum*, 12 in., Trop. America; *Moorei*, 12 in., Peru; *palmatum*, 10 in., Peru; *peruvianum*, 1 ft., Peru; *tenerum*, to 3 ft., West Indies, and var. *farleyense*, 3 ft., Barbados; *trapeziforme*, 2 to 3 ft., Trop. America, and var. *Sanctae-Catharinae*, deeper lobes.

GREENHOUSE SPECIES: *A. aethiopicum*, 6 to 8 in., Australia, Chile, California, etc.; *affine*, 12 in., New Zealand; *Capillus-Veneris*, 6 in., Temperate Zone, and numerous varieties; *diaphanum*, to 6 in., Asia to New Zealand; *excisum*, to 1 ft., Chile; *formosum*, to 2 ft., Australia; *hispidulum*, fronds forked at base, Tropics; *venustum*, 2 ft., Himalaya; *Williamsii*, 12 in., Peru.

HARDY SPECIES: *A. pedatum*, 1 to 3 ft., N. America; *venustum*, 'Don's Canadian Form', evenly-built large fronds, 1 ft.

Adlumia—*Fumariaceae*. Hardy climbing biennial. First introduced late eighteenth century.

CULTURE: Soil, light, rich. Position, warm border against south wall, or trellis in open garden. Plant, May.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in border in April, or in pots in temp. 55° to 65°, March.

SPECIES CULTIVATED: *A. fungosa* (syn. *A. cirrhosa*), 'Climbing Fumitory', 'Alleghany Vine', white or purple, Aug., 10 to 15 ft., N. America.

Adonis (Pheasant's Eye)—*Ranunculaceae*. Hardy annuals and herbaceous perennials. First introduced early seventeenth century.

CULTURE: Soil, ordinary, fairly rich. Position, open border for annuals, rock garden for perennials. Plant, autumn or spring.

PROPAGATION: Annuals by seeds sown shallowly in borders in March; perennials by seeds and by division of roots in spring or autumn.

SPECIES CULTIVATED: *A. aestivalis*, crimson, June, 1 ft., annual, S. Europe; *amurensis*, yellow, Jan., 1 ft., China; *annua* (syn. *A. autumnalis*), 'Red Chamomile', scarlet, May to Sept., 1 ft., annual, Britain; *brevistyla* (syn. *A. Davidii*, hort.), white, backs of petals blue, 9 to 12 in., summer, Tibet, W. China; *chrysocyathus*, golden-yellow, summer, 9 to 12 in., Kashmir; *pyrenaica*, yellow, July, 1 ft., Pyrenees; *vernalis*, yellow, March to May, 18 in., S. Europe.

Adromischus—*Crassulaceae*. Succulent herbs sometimes included in *Cotyledon* but with botanical differences.

CULTURE: Porous compost, well-lit greenhouse, temperature not below 55° F.

PROPAGATION: By leaf-cuttings.

SPECIES CULTIVATED: *A. Cooperi* (syn. *Cotyledon Cooperi*), red and greenish, to 1 ft., S. Africa; *cristatus*, to 10 in., S. Africa; *hemisphaericus*, to 14 in., S. Africa; *maculatus*, grey-green leaves blotched with red-purple, S. Africa; *rhombofolius*, grey-green scaly leaves, S. Africa.

Aechmea—*Bromeliaceae*. Stove, evergreen flowering plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts of fibrous loam, rough peat, leaf-mould. Pot, March. Water freely always. Good drainage essential. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By offshoots inserted in small pots at any time.

SPECIES CULTIVATED: *A. Barleei*, yellow, July, 2 ft., W. Indies; *bromeliifolia*, Trop. America; *calyculata*, yellow, Brazil; *coelestis*, blue, July, 18 in., Brazil; *Drakeana*, rose and blue, 1½ ft., Ecuador; *fasciata*, pink and blue, Aug., 18 in., Brazil; *fulgens*, scarlet, Aug. and Sept., 18 in., French Guiana, var. *discolor*, scarlet and purple, June, 2 ft., Brazil; *hystrix*, scarlet, Feb., Brazil; *Lindenii*, scarlet and purple, Aug., 2 ft., Brazil; *Mariae-Reginae*, violet and crimson, Aug. to Dec., 2 ft., Costa Rica; *Ortgiesii* (syn. *Ortgiesia Tillandsioides*), red, 6 to 8 in., Brazil; *Pineliana*, Brazil; *polystachya*, Brazil, Argentine; *spectabilis*, rose, 2 ft., Venezuela, Colombia; *Veitchii*, red, July to Sept., 18 in., Colombia; *Weilbachii*, Brazil. See also *Canistrum*.

Aegle—*Rutaceae*. One species, small tree with hard greenish-yellow fruits, pulp of which is used for drinks and medicine. *A. sepiaria* has been transferred to *Poncirus*.

CULTURE: Soil, good. Grown in warmer citrus regions.

PROPAGATION: By seed.

SPECIES CULTIVATED: *A. Marmelos*, 'Bael Fruit', white, April, India.

Aeonium—*Crassulaceae*. Succulent plants of Madeira and the Canary Islands, often included in the genus *Sempervivum* but now kept distinct.

CULTURE: Compost, equal parts loam, leaf-mould and brick rubble. Position, well-drained pots or pans in sunny part of greenhouse or window. Pot, March. Water moderately April to Oct., keep nearly dry rest of year. No stimulants, shading or syringing required. Temp., March to Oct. 55° to 75°, Oct. to March 40° to 50°.

PROPAGATION: By seeds sown in spring in compost of equal parts sandy loam, leaf-mould and old mortar in well-drained, shallow pans, lightly covered with fine soil in temp. 55° to 65°; cuttings of shoots or leaves dried for a day or so after removal from plant and inserted in above compost in summer; division of offsets in March.

SPECIES CULTIVATED: *A. arboreum* (syn. *Sempervivum arboreum*), yellow, to 4 ft., rosettes 6 in. diameter, Mediterranean Region, var. *variegatum*, leaves variegated, *foliis purpureis*, leaves dark purple; *tabuliforme*, pale yellow, evergreen sub-shrub to 1 ft. or more, Atlantic Isles.

Aerangis, see *Angraecum*.

Aeranthus—*Orchidaceae*. Evergreen epiphytes native to Madagascar. The plants are practically stemless, the foliage thin, strap-shaped. Scapes thin, flowers few, solitary in some, characterised by the segments having their basal halves broad with their apices contracted into a ribbon-like tail. Green is the prevailing colour.

CULTURE: Compost half sphagnum moss, half fibre with charcoal nodules. Position, small pans, shaded from sunlight. Water throughout the year. Temp. 70° in winter, higher in summer by sun-heat.

PROPAGATION: By division, but plants seldom attain a requisite size.

SPECIES CULTIVATED: *A. arachnites*, greenish or whitish, summer; *grandiflora*, greenish or yellowish, summer; *dentiens*, green, summer; *ramosum*, olive green, racemes branched, autumn.

Aerides—*Orchidaceae*. An epiphytic genus. Most species have beautiful flowers. Stems erect, sometimes branching. Leaves distichous, persistent. Flowers, often fragrant, in axillary spikes, sometimes branched, often drooping from the upper portions of the stems. Two rather large groups are included, of which *A. odoratum* is one type, with horn-like labellums, owing to the spur-shape, and the other, *A. multiflorum*, with a flat lip. The species are given here under their familiar names. Many digressions occur, some may be localised forms, some natural hybrids; some species have terete foliage, but in the greater number, the leaves are strap-shaped, glossy green, so that the plants are not without attraction at all seasons.

CULTURE: Compost, two parts of osmunda fibre, two parts of sphagnum moss, liberally mixed with broken potsherds or broken red brick, pots very well drained, or teak cylinders may be used; the former are the better, as the fleshy roots, in many, adhere to any surface and in repotting the pots may have to be broken, creating less disturbance to the roots than if they have to be torn from wood. Position not too sunny, never gloomy. For the majority, a winter night temp. of 65° or slightly higher is required and a moist atmosphere maintained throughout the year. Summer temp. from 70° to 85°, with shading and by sun heat. The syringe may be freely used in summer and water frequently given. In winter, watering is required and the syringe occasionally used, especially if pipe heat has been excessive.

PROPAGATION: The stems emit roots, with age the lower leaves fall. The stem may then be severed, always below healthy roots and the severed leafy portion potted, guiding some of the lower roots into the compost. Perform the operation in spring. The base can remain in the original receptacle and may develop basal

growths, which can be allowed to form a specimen plant, or, when rooted, taken off and potted.

SPECIES CULTIVATED: *A. crassifolium*, amethyst-purple, summer, leaves coriaceous, Burma; *crispum*, white, rose flushed, lip rose-purple, summer, 2 to 5 ft., variable, Bombay district; *falcatum*, racemes 12 to 18 in. long, sepals and petals creamy-white, crimson-tipped, mid-lobe of lip deep purple, summer, autumn, 2 to 5 ft., handsome, variable, India, Burma; *Fieldingii*, racemes 2 ft. long, often branched, white suffused and mottled rose-purple, lip rose-purple, summer, 2 to 3 ft., Assam; *japonicum*, white or greenish-white, marked red, lip with purple spots and ridge, dwarf, fragrant, summer, Japan; *Lawrenceae*, wax-like, fragrant, white, crimson-purple, large, autumn, 1 to 4 ft., Philippines; *Leeanum*, rose-purple, amethyst, winter, East Indies; *Lobbii*, white, rose-flushed, lip violet tinted, summer, Burma; *maculosum*, fragrant, rose, purple spotted, lip rose-purple, raceme branched, summer, Bombay; *multiflorum*, variable, widely distributed, light amethyst to purple, often spotted, summer, India; *odoratum* (syn. *A. suavissimum*), variable, fragrant, white and lilac-magenta, summer, India, China; *quinquevulnerum*, variable, white, tipped and spotted amethyst-purple, lip white, mid-lobe amethyst, late summer, 2 to 5 ft., Philippines, var. *Farmeri*, white, summer; *vandarum*, leaves terete with slender tips, which thicken in succeeding years, 1 to 3 ft., flowers, very fragrant, pure white, twisted, autumn and winter, India.

Aeschyanthus—*Gesneriaceae*. Stove trailing evergreen flowering plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous peat, sphagnum moss, charcoal. Position, hanging baskets, pots, or on blocks of wood or tree fern stumps. Plant, March. Water freely in summer, moderately in winter. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings, 3 in. long, of firm shoots inserted in pots of above compost mixed with sand in temp. 85°, Feb. or March.

SPECIES CULTIVATED: *A. atrosanguineus*, red, July, 1 ft., Guatemala; *Boschianus*, scarlet, July, Sumatra; *bracteatus*, scarlet and yellow, Aug., 18 in., India; *fulgens*, scarlet and yellow, June, 1 ft., E. Indies; *grandiflorus*, scarlet, Aug., 5 ft., India; *Hildebrandii*, scarlet, July, 10 in., Burma; *javanicus*, red, June, scandent, Java; *Lobbianum*, scarlet, June, 1 ft., Java; *pulcher*, scarlet, June, Java; *purpurescens*, purple and yellow, March, 1 ft., Java; *speciosus*, orange, summer, Java; *tricolor*, red and yellow, July, 1 ft., Borneo; *zebrina*, (syn. *trichosporium marmoratum*) green, spotted brown, habitat unknown.

Aesculus—*Hippocastanaceae*. Hardy, deciduous flowering trees and shrubs. Timber not of much value, used chiefly for making packing cases, carving, etc. Deer are fond of the nuts. First introduced early seventeenth century.

CULTURE: Soil, ordinary, deep. Position, shrubberies, woods, lawns, parks. Plant, Oct. to March. Prune away dead wood in winter.

PROPAGATION: By seeds sown 3 in. deep in open border soon as ripe; layering Feb.; grafting choice varieties in March or budding in July.

SPECIES CULTIVATED: *A. californica*, white, July, 20 ft., California; *carnea*, 'Red Horse Chestnut', red, June, 30 to 50 ft., hybrid, vars. *Briotii*, best red form, *plantierensis*, seedless form, pink flowers; *chinensis*, white, May or June, 80 to 90 ft., N. China; *glabra*, yellow, May, 30 ft., U.S.A.; *Hippocastanum*, 'Horse Chestnut', white, May, 30 to 100 ft., S.E. Europe, and its vars. *Baumanii*, *Memmingeri*, *luteo-variegata*, *laciniata*, *pumila*, etc.; *indica*, white, blotched yellow and rose, June, July, up to 100 ft., Himalaya; *mutabilis*, yellow and red, June, hybrid, and vars. *Harbisonii*, long spikes of red flowers, *induta*, shrubby type with coppery pink flowers; *neglecta*, pale yellow, veined red, to 60 ft., N. Carolina, var. *georgiana*, shrubby, yellow and red flowers; *octandra*, 'Yellow Buckeye', 'Sweet Buckeye', yellow, May, 30 to 90 ft., S.E. United States; *parviflora* (syn. *A. macrostachya*, *Pavia alba*), 'Dwarf Buckeye', 10 ft., spreading, white, U.S.A.; *Pavia*, (syn. *Pavia rubra*), 'Red Buckeye' red, June, 10 to 20 ft., U.S.A.;

splendens, handsome 12 ft. shrub, scarlet, U.S.A.; *turbinata*, 'Japanese Horse Chestnut', creamy, June, to 100 ft., Japan.

Aethionema (Stone Cress)—*Cruciferae*. Hardy evergreen perennials. First introduced late eighteenth century.

CULTURE: Soil, ordinary, light. Position, sunny rockery, well drained. Plant, Oct. or March.

PROPAGATION: By cuttings of shoots inserted in pots of sandy soil in cold frame, July or Aug.

SPECIES CULTIVATED: *A. armenum*, pink, June, 6 in., Armenia and Palestine; *coridifolium*, 'Lebanon Candytuft', rose, June, 6 to 9 in., Orient; *diastrophis*, pink, summer, 9 in., Russian Armenia; *grandiflorum*, rose, May, 1 ft., Persia; *iberideum*, white, sometimes flushed lilac, June, 6 in., Levantine Alps; *oppositifolium* (*Eunomia oppositifolia*), lilac, 2 in., spring, Syria; *pulchellum*, rosy purple, June, 6 in., Armenia; *saxatile*, 'Candy Mustard', to 1 ft., small pink fls. in raceme, May to June, S. Europe; *schistosum*, pink, early summer, 6 in., Cilician Taurus; *warleyense*, 'Warley Rose', rose-pink, summer, 3 to 6 in., compact, hybrid.

African Blue Lily, see *Agapanthus africanus*; **-Corn Lily**, see *Ixia*; **-Cypress**, see *Widdringtonia*; **-Harebell**, see *Roellia ciliata*; **-Harlequin Flower**, see *Sparaxis*; **-Hemp**, see *Sparmannia africana*; **-Lily**, see *Agapanthus africanus*; **-Marigold**, see *Tagetes erecta*; **-Ragwort**, see *Othonna*; **-Tea Tree**, see *Lycium afrum*; **-Violet**, see *Saintpaulia ionantha*.

Agalmyla (Scarlet Root-blossom)—*Gesneriaceae*. Stove, trailing evergreen plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, sphagnum moss, and charcoal. Position, hanging baskets. Plant, March. Water freely March to Sept., moderately Sept. to March. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings of firm shoots under bell-glass, in temp. 80°, July or Aug.

SPECIES CULTIVATED: *A. longistyla*, crimson, July, 1 ft., Java; *staminea*, scarlet, June, 6 in., Java.

Aganisia—*Orchidaceae*. Stove epiphytal orchids. True Aganisia seem to have a scandent habit with pseudo-bulbs at short intervals. First introduced mid-nineteenth century.

CULTURE: Compost, fibrous peat or osmunda and sphagnum moss, equal. Position, a raft covered with a thin layer of compost is suitable. Water freely when growing, moderately when at rest. Resting period, winter. Scapes appear at base of new pseudobulb. Temp., Sept. to March 65° to 70°, March to Sept. 75° to 85° with shading.

PROPAGATION: By division of plants when new growth begins and the plants are large enough.

SPECIES CULTIVATED: *A. pulchella*, scapes erect, flowers 3 to 6, white with a purplish-red lip, British Guiana.

Agapanthus—*Liliaceae* (or *Amaryllidaceae*). Cool greenhouse, evergreen herbaceous plant. Hardy S. England, Ireland. First introduced late seventeenth century.

CULTURE: Compost, two parts loam, one part leaf-mould, dried cow manure, river sand. Position, well-drained border or rockery outdoors. Pot or plant, March. Water freely March to Sept., moderately afterwards. Temp., Sept. to March 32° to 40°, March to Sept. 45° to 55°.

PROPAGATION: By division of plant in March.

SPECIES CULTIVATED: *A. africanus* (syn. *A. umbellatus*, *A. umbellatus minor*), 20 in; *campanulatus* (*A. umbellatus Mooreanus*) 20 in.; *orientalis* (*A. umbellatus maximus*), var. *albus*, 2 to 3 ft., Cape, commonly cultivated as *A. umbellatus*.

Agaricus (Mushroom)—*Fungi*. Hardy esculent vegetable.

CULTURE INDOORS: On prepared beds in cellars, sheds, or other completely darkened buildings where an even temperature may be maintained.

CULTURE OUTDOORS: On steeply-ridged beds in the open or against sun-warmed wall. Mushrooms may also be cultivated with variable success in pasture grass.

PREPARING BEDS: Compost, fresh manure in a loose heap, turning it repeatedly for nine or ten days until friable and cheesy. Or use short straw or chaff thoroughly wetted and dressed with a proprietary rotting agent. Make indoor beds about a yard wide, depth 9 in., trodden or beaten thoroughly firm. Outdoor beds should have 3 ft. base, 2½ ft. height with ridge not wider than 6 in. Cover the beds with up to 1 ft. of clean wheat straw to prevent evaporation. Test daily with thermometer thrust into middle of bed, and spawn when heat is between 75° and 80° F.

SPAWNING: Break brick of spawn into eight pieces. Bury pieces 2 in. deep at intervals of 9 in. all over bed. A fortnight later, as soon as the mycelium is seen to be running, cover with 1 in. of fine second-spit soil. Keep the casing soil moist but do not allow the water to penetrate the bed. Outdoor beds must be well thatched with straw to 6 in. thickness in summer, 1 ft. in winter. Spawn outdoor beds in July, Oct. or Jan.; indoor beds any time between midsummer and March. Bearing should commence about six to eight weeks after spawning and continue for three months or longer. Gather mushrooms by pulling the stalk from the bed; never by cutting.

CULTURE IN GRASS: Cut out pieces of turf 6 to 12 in. square, 1 in. thick, and 3 ft. apart. Stir soil below and press into it three or four lumps of spawn, about the middle of June. Replace turf and water occasionally if dry. Best results obtained where herbage is short, soil loamy and dry, and position sunny.

SPECIES CULTIVATED: *A. hortensis* (syn. *A. campestris* var. *hortensis*, *Psalliota hortensis*, *P. bispora*), now considered a species distinct from the Field Mushroom, *A. campestris* (syn. *P. campestris*).

Agastache, see *Brittonastrum*.

Agathaea, see *Felicia*.

Agave—Amaryllidaceae (or *Agaveaceae*). Greenhouse, evergreen flowering plants. Leaves usually stiff and spiny and yellowish green or red flowers, borne on spikes 1 to 40 ft. high when plants attain 10 to 60 years of age. In some cases the plant dies after flowering. First introduced early seventeenth century.

CULTURE: Compost, two parts loam, one part old mortar and river sand. Position, pots or tubs in greenhouses; may be stood outside June to Sept. Water moderately April to Aug., little afterwards. Pot, every five or six years; good drainage essential. Temp., winter 50° to 55°, summer 55° to 65°.

PROPAGATION: By offsets inserted in small pots at any time.

SPECIES CULTIVATED: *A. albicans*, 3 to 4 ft., Mexico; *americana*, 'American Aloe', 'Century Plant', 30 to 40 ft., Trop. America, and its vars. *medio-picta*, leaves yellow, edged green, and *variegata*, leaves dark green and yellow; *angustifolia* (syn. *A. vivipara*), to 8 ft., Cent. America, and var. *variegata*; *atrovirens*, 20 to 30 ft., S. Mexico; *attenuata* (syn. *A. glaucescens*), 6 to 10 ft., Mexico; *Botteri*, Mexico; *Celsii*, 4 ft., Mexico; *dasyliroides*, 10 ft., Guatemala; *densiflora*, 2 to 3 ft., Mexico; *ferox*, 20 to 30 ft., Mexico; *filifera* (syn. *A. filamentosa*), 10 to 15 ft., Mexico; *fourcroydes* (syns. *A. Ixtli*, *A. ixtlioides*, and *A. rigida*); *Ghiesbreghtii*, dwarf, Mexico, and var. *macrantha*; *ingens*, 20 to 30 ft., Mexico; *Kerchovii*, 12 to 18 ft., Mexico, and vars. *canaliculata*, *inermis*, *Veitchii*; *lophantha*, 12 to 15 ft., Mexico, and vars. *caerulescens*, glaucous leaved, and *Poselgeri*, leaves striped; *marmorata*, Mexico; *Morrisii*, Jamaica, and var. *variegata*; *noli-tangere* (syn. *A. horrida*), 8 ft., Mexico; *polyacantha*, 10 to 15 ft., Mexico; *potatorum* (syn. *A. Scolymus*), 12 ft., Mexico; *Roezliana*, Mexico; *Salmiana*, 30 ft., Mexico; *Shawii*, 8 to 10 ft., California; *sisalana*, 'Sisal Hemp', 15 to 20 ft., Yucatan; *striata*, 12 ft., Mexico; *stricta* (syns. *A. hystrix* and *Bonaparteia hystrix*), 10 to 12 ft., Mexico, and var. *glauca*, glaucous leaved; *utahensis*, 5 ft., Utah, Arizona; *Victoriae*-

Reginae, 10 to 12 ft., Mexico; *yuccifolia*, 20 ft., Mexico. There are many other species.

Ageratum (Floss-flower)—*Compositae*. Half-hardy annuals. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Plant 6 to 8 in. apart in June.

PROPAGATION: By seeds sown in light soil in temp. 60° in March, or by cuttings of young shoots from plants preserved for stock by growing in pots, pinching periodically to prevent flowering, and wintering in greenhouse temp. 50°.

SPECIES CULTIVATED: *A. Houstonianum* (syn. *A. mexicanum*), blue, summer, 18 in. to 2 ft., Tropics. Numerous dwarf forms and white varieties will be found in seed lists.

Aglaonema—*Araceae*. Stove perennials with arum-like flowers and variegated green leaves blotched with grey. First introduced mid-nineteenth century.

CULTURE: Compost, two-thirds loam, one-third leaf-mould, river sand. Position, well-drained pots, shady. Water freely when growing, little afterwards. Syringe foliage daily. Pot, March. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *A. angustifolium*, greenish white, July, 18 in., Straits Settlements; *commutatum*, white, July, 1 ft., Malaya; *costatum*, white, July, 6 in., Perak, and var. *virens*; *marantifolium*, white, 1½ ft., Malaya; *Mannii*, greenish white, July, 18 in., Trop. Africa; *modestum*, 'Chinese Evergreen', 12 to 20 ft., Philippines. *oblongifolium*, crimson, July, 4 ft., Malaya; *pictum*, white, Aug., 18 in., Malaya; *simplex*, white, July, 18 in., Java.

Agrostemma, see *Lychnis*.

Agrostis—*Gramineae*. Hardy annual flowering grasses. Inflorescence light and graceful and valuable for cutting for mixing with flowers in summer, or drying for winter decoration. Also as pot plants.

CULTURE: Soil, ordinary. Position, sunny border.

PROPAGATION: By seed sown ⅛ in. deep in April in open borders where plants are to grow.

SPECIES CULTIVATED: *A. alba*, 'Fiorin', July, 2 ft., Europe; *nebulosa*, 'Cloud Grass', July, 18 in., Spain; *stolonifera*, July, 1½ ft., Europe. For *A. pulchella*, see *Aira elegans*.

Aichryson—*Crassulaceae*. Succulent plants of the Canary Islands intermediate between *Sedum* and *Sempervivum* and formerly included in the latter genus.

CULTURE: As *Aeonium*.

PROPAGATION: As *Aeonium*.

SPECIES CULTIVATED: *A. dichotomum*, yellow, stems hairy, annual or biennial; *domesticum* (syn. *Sempervivum tortuosum*), yellow, free flowering, erect, slightly shrubby, hybrid; *tortuosum*, golden-yellow, dense downy shrub; *villosum*, golden-yellow, to 4 in., sticky-hairy, Madeira, Azores.

Ailanthus—*Simarubaceae*. Handsome, hardy deciduous trees with ornamental foliage. First introduced mid-eighteenth century.

CULTURE: Soil, light, rich. Position, sheltered, moist. Plant Nov. *A. altissima* and its variety *pendulifolia* may be pruned to the ground annually in March to provide handsome foliage shrubs.

PROPAGATION: By portions of roots in pots of light soil in March. They should be kept close in a frame or cloche until growth starts, transplant the following spring.

SPECIES CULTIVATED: *A. altissima* (syn. *A. glandulosa*), 'Tree of Heaven', leaves pinnate, 30 to 60 ft., China, and vars. *erythrocarpa*, fruits bright red, *pendulifolia*, leaves large and drooping, *sutchuenensis*, fruits larger.

Aipyanthus, see *Arnebia*.

Aira (Hair Grass)—*Gramineae*. Hardy annual ornamental grass.

CULTURE: Soil, ordinary. Sow seed in April, where plants are required. Position open. May be grown in pots in the cold greenhouse.

SPECIES CULTIVATED: *A. elegans* (syn. *A. capillaris*), 12 to 18 in., S. Europe, var. *pulchella*, awned florets.

Ajuga (Bugle)—*Labiatae*. Hardy perennials.

CULTURE: Soil, ordinary. Position, margins of half-shady beds, borders and rockeries.

PROPAGATION: By seeds sown outdoors in April, division of roots Oct. or March.

SPECIES CULTIVATED: *A. chia*, bright yellow, summer, 9 in., Cyprus; *genevensis*, blue, June, 6 in., non-trailing, Europe; *hybrida*, blue, June, 6 in., hybrid; *metallica crispa*, curiously curled, crinkled foliage of bright metallic tints; *orientalis*, blue, June, 12 to 18 in., E. Europe; *reptans*, blue, white or rose, June, 6 in., Britain, and vars. *atropurpurea*, purple leaves, *variegata*, leaves variegated, pale pink and cream, *Brockbankii*, blue.

Akebia—*Berberidaceae* (or *Lardizabalaceae*). Hardy climbing shrubs. First introduced mid-nineteenth century.

CULTURE: Soil, loam, peat and sand in equal parts. Position, south wall in S. England and Ireland; cool greenhouse other parts. Plant, Oct., Nov. in border. Prune straggling shoots after flowering. Whilst these shrubs are quite hardy, fruit is only likely to be formed in sheltered positions.

PROPAGATION: By cuttings inserted in sandy soil in gentle heat or by layers in autumn.

SPECIES CULTIVATED: *A. trifoliata* (syn. *A. lobata*), deciduous, vigorous climber, flowers purple followed by pale violet-tinted fruits, China and Japan; *quinata*, evergreen, violet or purple, fragrant, May and June, 30 to 40 ft., China and Japan.

Akee, see *Blighia sapida*.

Alabama Snow Wreath, see *Neviusia alabamensis*.

Alangium—*Alangiaceae*. Hardy shrub.

CULTURE: Ordinary light soil, moderately sheltered sunny position.

PROPAGATION: Rooted offsets in November or March.

SPECIES CULTIVATED: *A. platanifolium* (syn. *Marlea platanifolia*), deciduous, 6 ft., large maple-like leaves, small tubular white flowers, Japan.

Albizia (Pink Siris or Nemu Tree)—*Leguminosae* (or *Mimosaceae*). Slightly tender, deciduous acacia-like tree. Used as foliage plant for sub-tropical bedding as young plants. Introduced eighteenth century.

CULTURE: Ordinary light soil. Needs a high wall for successful cultivation.

PROPAGATION: Seeds sown $\frac{1}{2}$ in. deep in March in heat.

SPECIES CULTIVATED: *A. Julibrissin*, pink, to 30 ft., not hardy in the open through average winters, W. Asia, var. *rosea*, dwarfer and hardier than the type.

Albuca—*Liliaceae*. Half-hardy bulbous plant. First introduced mid-nineteenth century.

INDOOR CULTURE: Compost, two parts loam, one part equal proportions of peat, leaf-mould, and silver sand. Position, cool greenhouse. Pot in Nov., placing five bulbs 3 in. deep in a $4\frac{1}{2}$ in. pot. Cover pot with sphagnum moss or leaf-mould until growth begins, then expose to light. Water freely from time bulbs begin to grow until flowers fade, after which keep dry until Nov.

OUTDOOR CULTURE: Soil, light ordinary. Position, well-drained border at base of south greenhouse or hothouse wall. Plant 6 in. deep in Oct.

PROPAGATION: By seeds or offsets in spring.

SPECIES CULTIVATED: *A. angolensis*, yellow, 2 ft., Angola; *aurea*, yellow, June, 2 ft., S. Africa; *fastigiata*, white, May, $1\frac{1}{2}$ ft., S. Africa; *Nelsonii*, white and red, fragrant, June, 2 to 3 ft., Natal.

Alchemilla (Lady's Mantle)—*Rosaceae*. Hardy herbaceous perennials with palmately-lobed or divided leaves and small greenish or yellowish flowers in corymbs.

CULTURE: Soil, ordinary, moist, well drained. Position, rock garden or front of border. Plant, autumn or spring.

PROPAGATION: By division; seeds.

SPECIES CULTIVATED: *A. alpina*, flowers green, foliage silvery, 6 in., Europe, inc. Britain; *conjuncta*, green, foliage silvery, 6 in., Alps; *mollis*, greenish-yellow, leaves green, very hairy, July, 1 to 1½ ft., S.E. Europe; *speciosa*, greenish-yellow, leaves green, July, Caucasus. Other species, e.g. *A. asterophylla*, *A. rigida*, *A. sericata*, *A. subsericea*, in botanic gardens.

Alder, see *Alnus*.

Alexandrian Laurel, see *Danae racemosa*.

Algerian Iris, see *Iris unguicularis*; — **Wax Bean**, see *Phaseolus vulgaris*.

Alisma (Water-Plantain)—*Alismaceae*. Hardy aquatic perennials with plantain-like foliage and whorled panicles of rosy flowers, apt to be weedy.

CULTURE: Soil, loam. Position, shallow water. Plant, spring.

PROPAGATION: By division; seed sown in shallow pans of loam and charcoal barely covered with water.

SPECIES CULTIVATED: *A. gramineum*, foliage ribbon-like when grown submerged, cosmopolitan; *lanceolatum*, 12 to 18 in., Europe, India, N. Africa; *Plantago-aquatica*, rose, summer, 2 to 3 ft., Britain; *rariflorum*, white, 12 in., Japan. For *A. natans*, see *Luronium*.

Alkanet, see *Anchusa*.

Allamanda—*Apocynaceae*. Stove, evergreen climbing plants. First introduced late eighteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould, charcoal and coarse sand. Position, pot, tub or prepared border; shoots to be trained close to roof. Pot, Feb. Water freely April to Aug, then moderately. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°. Prune shoots in Jan. to within one joint of main branch.

PROPAGATION: By cuttings of shoots of previous year's growth 3 in. long in pots of sandy soil in temp. 80° in spring. *A. violacea* succeeds best when grafted on to the more vigorous *A. cathartica* or one of its varieties.

SPECIES CULTIVATED: *A. cathartica*, yellow, July, 5 to 10 ft., Brazil, and vars. *grandiflora*, flowers to 4½ in. across, *Hendersonii* (syn. *A. Hendersonii*), leathery leaves, *magnifica*, 8 to 10 ft., *nobilis*, magnolia-like fragrance, *Schottii*, yellow with dark-striped throat, *Williamsii*, yellow with reddish-brown throat; *neriifolia*, yellow, June, to 3 ft., half-climbing or erect, Brazil; *violacea*, lavender, summer, 6 to 8 ft., Brazil.

Alleghany Vine, see *Adlumia fungosa*.

Alligator Apple, see *Annona palustris*; — **Pear**, see *Persea americana*.

Allium—*Liliaceae* (or *Amaryllidaceae*). Hardy and greenhouse bulbous perennials, vegetable and ornamental, with a strong onion or garlic odour.

CULTURE OF FLOWERING SPECIES AND CHIVES: Soil, ordinary, well drained. Position, sunny (for most species) borders, shrubberies and rockeries. Plant, Oct. to Nov., covering bulbs to twice diameter with soil.

PROPAGATION: By offsets or seeds in rich gritty soil in spring.

CULTURE OF GREENHOUSE SPECIES: The smaller and more delicate species of *Allium*, e.g. *A. acuminatum*, *amabile*, *cyaneum*, *Farreri*, *oreophilum* and *subhirsutum* are suitable for pans in the cool greenhouse and alpine house. *A. neapolitanum* is used for forcing. Compost, open. Plant dormant bulbs almost touching and plunge in ashes till growth begins. Remove to cold frame till growth is well advanced. Flower in cold greenhouse or force *A. neapolitanum* in temp. 60°. Water freely when growing, dry off after flowering. Increase by offsets removed at potting time or seeds sown in spring.

CULTURE OF ONION: Soil, rich, manured, well drained, retentive and deeply dug. Position, sunny. Prepare bed in autumn by digging deeply and working

in well-rotted manure. Give balanced liquid manure during growth. Sow in boxes in greenhouse in January for early and exhibition crops, planting out in April after hardening off. Sow outdoors in August and transplant in early March with 6 to 8 in. between plants; or sow in March and thin to this distance, using large thinnings for salads. Bend over tops in mid-August to hasten ripening and dry before storing in frost-free shed.

CULTURE OF LEEKS: Soil, thoroughly dug and well manured. Sow early March to mid-April in prepared seed bed. When about 6 in. high transplant deeply into dibber holes 9 in. apart, and firm by watering. Leeks are quite hardy and can be harvested as required.

CULTURE OF SHALLOTS: Soil, deeply dug and manured. Plant bulbs 6 in. apart, pressing them into the soil until only the tip protrudes, end of Feb. Lift and dry end of July; save some small bulbs as stock for next year. May be grown from seed sown in March but these bulbs should not be planted as they will run to seed.

CULTURE OF GARLIC: Soil, rich. Plant bulbs 2 in. deep and 6 in. apart in Feb. Lift and store early August. Increase by division of bulbs.

PROPAGATION: By seed; offsets.

HARDY FLOWERING SPECIES CULTIVATED: *A. acuminatum*, lilac, June, 6 to 9 in., W.N. America; *albopilosum*, lilac, June, 1½ ft., Cent. Asia; *atropurpureum*, dark red, June, 3 ft., E. Europe; *Babingtonii*, pale red, July, 4 to 6 ft., Britain; *Beesianum*, blue, July, 1 ft., W. China; *Breweri*, violet-purple, June, 3 in., California; *bulgaricum* (syn. *Nectaroscordum bulgaricum*), whitish, May, 3 ft., S.E. Europe; *caeruleum* (syn. *A. azureum*), light blue, June to July, 1 to 3 ft., W. Siberia, Cent. Asia; *caesium*, dark blue, June to July, 1 to 3 ft., W. Siberia, Cent. Asia; *campanulatum* (syn. *A. Bidwilliae*), pale pink, June, 8 in., California; *caspium*, dull red and green, June, 1 ft., Cent. Asia; *cernuum*, rose, June to July, 1 to 1½ ft., N. America; *Cyrilli*, lilac, June, 2 to 3 ft., S. Europe; *cyaneum*, dull blue, August, 6 in. N.W. China; *denudatum* (syn. *A. albidum*), creamy-white, July, 6 to 12 in., Caucasus, E. Europe; *Farreri*, reddish purple, June, 6 to 12 in., N.W. China; *flavum*, sulphur yellow, July, 1 ft., S. Europe; *giganteum*, lilac, June, 4 to 5 ft., Cent. Asia; *karataviense*, lilac, May to June, 9 in. Cent. Asia; *macranthum* (syn. *A. oviflorum*), purple, June to July, E. Himalaya, China; *Mairei* (syn. *A. yunnanense*), pale rose, Aug. to Sept., 4 to 8 in., W. China; *Moly*, bright yellow, June, 1 to 1½ ft., S.W. Europe; *Murrayanum*, rose, June, 1 to 1½ ft., W.N. America; *narcissiflorum* (syn. *A. pedemontanum*), red-purple, July, 9 in., Alps; *neapolitanum*, white, June, 1 ft., S. Europe; *nigrum* (syn. *A. multibulbosum*), white, June, 2 to 3 ft., S. Europe; *nutans*, pink, July, 1½ to 2 ft., Siberia; *obliquum*, greenish-yellow, May to June, 2 to 3 ft., E. Europe, Siberia; *ochroleucum*, yellowish-white, July to Aug., 12 in., Cent. Europe; *oreophilum*, deep rose, May, 6 in., Caucasus, Cent. Asia, and var. *Ostrowskianum*, light rose; *oxyphilum*, white or pale pink, July to Aug., 10 to 20 in., Virginia; *paradoxum*, white, April, 1 ft., Caucasus; *pendulinum*, white, April to May, 6 to 9 in., S. Europe; *pulchellum*, lilac-purple, July to Aug., 1½ ft., S. Europe; *ramosum* (syn. *A. odorum*), white and rose, June to July, 2 ft., Cent. Asia; *roseum*, light rose, June, 1 to 1½ ft., S. Europe, var. *bulbiferum*, common in gardens; *Schubertii*, rose, June, 1 ft., W. and Cent. Asia; *scorzonerifolium*, bright yellow, June, 6 to 9 in., unknown; *siculum* (syn. *Nectaroscordum siculum*), green and dull pink, May, 3 ft., S. Europe; *sphaerocephalon*, dark red, July to Aug., 1½ to 2½ ft., Europe, inc. Britain; *stipitatum* (syn. *A. Rosenbachianum* hort.), lilac, June, 3 to 4 ft., Cent. Asia; *subhirsutum*, white, May, 6 in., S. Europe; *triquetrum*, white with green line, May, 9 in. to 1 ft., S. Europe, N. Africa; *tuberosum*, 'Chinese Chives', white, Aug. to Oct., 2 ft., China, Japan; *unifolium*, rose, June, 1 to 1½ ft., California; *ursinum*, 'Ramsons', white, May, 1 ft., Europe, inc. Britain; *Victorialis*, white, May, 1 to 2 ft., Alps; *zebdanense*, white, April to May, 1½ ft., Syria.

KITCHEN GARDEN SPECIES CULTIVATED: Most of these have been in cultivation for many hundreds of years and their exact origin is uncertain. *A. Ceba*, 'Common Onion', and vars. *aggregatum*, 'Potato Onion', *ascalonicum*, 'Shallot',

perutile, 'Everlasting Onion' (sometimes incorrectly called Welsh Onion), *viviparum*, 'Tree Onion', 'Top Onion', derived from a Cent. Asian species; *fistulosum*, 'Welsh Onion', derived from an East Asiatic species; *Porrum*, 'Leek', derived from a Mediterranean species; *sativum*, 'Garlic', derived from a Cent. Asian species; *Schoenoprasum*, 'Chives', Europe, inc. Britain, N. Asia; *Scorodoprasum*, 'Rocambole', Europe; *tuberosum*, 'Cuchay', 'Chinese Chives', E. Asia.

Allspice, see *Pimenta officinalis*; **Carolina-**, see *Calycanthus floridus*.

Almond, see *Prunus Amygdalus*; **-Scented Orchid**, see *Odontoglossum madrense*.

Alnus (Alder)—*Betulaceae*. Hardy deciduous trees and shrubs. Timber of little value, except for making charcoal for gunpowder and also for its extreme durability under water.

CULTURE: Soil, ordinary. Position, damp places for *A. glutinosa*; drier spots for the others. Plant, Nov.

PROPAGATION: By seeds sown 1 in. deep in damp soil in March, transplanting the seedlings when a year old; or by suckers springing from the roots in Nov., or cuttings of firm wood after fall of leaf, inserted in open ground.

SPECIES CULTIVATED: *A. glutinosa*, 'Common Alder', 50 to 90 ft., Britain, Europe, N. Africa and Asia, and vars. *aurea*, golden-leaved, *laciniata*, cut-leaved, and *quercifolia*, oak-leaved; *incana*, 'Grey Alder', 50 to 70 ft., N. Temp. Zone, and vars. *aurea*, *pendula* and *pinnatifida*. There are others, but they are of no special interest.

Alocasia—*Araceae*. Stove plants with ornamental foliage. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, sphagnum moss, fibrous loam, with a little silver sand and charcoal. Pot, March, keeping base of plant above rim of pot; good drainage essential. Position, pots, shady. Water freely March to Sept., moderately afterwards. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By division of rhizomes in March.

SPECIES CULTIVATED: *A. argyrea*, 1½ ft., Trop. Asia; *Chantrieriana*, hybrid; *conspicua*, hybrid; *cucullata*, India; *cuprea*, 18 in., Borneo; *eminens*, Malaya; *esculenta*, habitat unknown; *gigas*, 5 ft., hybrid; *indica*, 4 to 6 ft., Malaya, and vars. *metallica* and *variegata*; *Korthalsii* (syn. *A. Thibautiana*), Borneo; *Lindenii*, New Guinea; *longiloba*, 1 ft., Malaya; *Lowii*, 2 ft., Borneo; *Marshallii*, India; *macrorhiza*, to 15 ft., Trop. Asia, and var. *variegata*; *Putzeysii*, Sumatra; *Sanderiana*, 18 in., Philippines; *zebrina*, 4 ft., Philippines.

Aloe—*Liliaceae*. Greenhouse, evergreen succulent plants with fleshy and more or less prickly or spiny leaves and red or yellow flowers borne on slender spikes. First introduced late sixteenth century.

CULTURE: Compost, two parts loam, one part peat, old mortar, river sand. Position, pots or tubs, sunny greenhouse. Water moderately April to Aug., little afterwards. Pot, March; good drainage indispensable. Temp., winter 50° to 55°, summer 55° to 65°.

PROPAGATION: By seeds sown in well-drained pans of sandy soil, temp. 70°.

SPECIES CULTIVATED: *A. abyssinica*, Abyssinia; *africana*, S. Africa; *arborescens*, and vars. *frutescens*, *natalensis*, *Ucriae* and *viridiflora*, S. Africa; *ciliaris*, S. Africa; *humilis*, and vars. *echinata*, *incurva* and *subtuberculata*, S. Africa; *Johnstonii* (syn. *A. Cooperi*), S. Africa; *Kirkii*, Zanzibar; *mitriformis*, and vars. *albispina*, *flavispina* and *spinulosa*, S. Africa; *striata*, S. Africa; *succotrina*, S. Africa; *variegata*, S. Africa; *vera*, Medit. Region. There are very many more species.

Alonsoa (Mask-flower)—*Scrophulariaceae*. Half-hardy shrubby perennials. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, pots, greenhouse, windows, or sunny beds outdoors, May to Sept. Water moderately always. Pot, March. Plant, May. Temp., Sept. to May 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep, March, temp. 60°, in sandy soil; cuttings, in pots of sandy soil, Aug.

SPECIES CULTIVATED: *A. acutifolia* (syn. *A. myrtifolia*), scarlet, and var. *alba*, white, 2 to 3 ft., Mexico; *incisifolia*, scarlet, summer, 18 in., Peru; *linearis* (syn. *A. liniflora*), scarlet, summer, 1 to 2 ft., Peru; *meridionalis* (syn. *A. Mutisii*), salmon pink, summer, 1 to 2 ft., Peru; *Warscewiczii*, scarlet summer, 18 in. to 2 ft., Chile.

Alopecurus (Lamb's-tail Grass)—*Gramineae*. Hardy perennial grasses.

CULTURE: Soil, any good light, well drained. Position, full sun.

PROPAGATION: By seeds sown when ripe in sandy soil and by division in spring.

SPECIES CULTIVATED: *A. lanatus*, woolly white, 4 to 6 in., summer, Spain; *pratense*, 'Meadow Foxtail', 3 ft., Europe.

Aloysia, see Lippia.

Alpine Azalea, see *Loiseleuria*; **-Bladder Fern**, see *Cystopteris alpina*; **-Catchfly**, see *Silene alpestris*; **-Currant**, see *Ribes alpinum*; **-Forget-me-not**, see *Myosotis alpestris*; **-Pink**, see *Dianthus alpinus*; **-Poppy**, see *Papaver alpinum*; **-Strawberry**, see *Fragaria vesca*; **-Wallflower**, see *Erysimum*.

Alpinia—*Zingiberaceae*. Stove herbaceous perennials. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, leaf-mould and loam. Position, large pots, tubs or beds. Plant, March. Temp., March to Sept. 55° to 65°, Sept. to March 70° to 80°. Water freely March to Aug., moderately other times.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *A. allughas*, red, Feb., 3 to 6 ft., India; *mutica*, white, red and yellow, July and Aug., 5 ft., Malaya; *pumila*, Hong Kong; *Rafflesiana* (syn. *A. vittata*), 2 to 3 ft., Malay Peninsula; *speciosa* (syn. *A. nutans*), 'Indian Shell Flower', white, purple and yellow, fragrant, to 12 ft., China and Japan.

Alsophila (Grove Fern)—*Cyatheaceae*. Stove and greenhouse tree ferns. A list of over ninety names has been compiled as being a complete list of *Alsophila* species but the majority of these have never been grown and are unlikely to be grown in this country. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part loam, silver sand and charcoal. Pot, March. Water freely March to Sept., moderately afterwards. Position, pots or tubs, in shade. Temp. stove species, Sept. to March 60° to 70°, March to Sept. 70° to 80°; greenhouse, Sept. to March 50° to 55°, March to Sept. 55° to 60°.

PROPAGATION: By spores as *Adiantum*.

STOVE SPECIES CULTIVATED: *A. aspera*, 20 to 30 ft., W. Indies; *atrovirens*, 60 ft. or over, Brazil; *infesta*, 3 to 4 ft., Trop. America.

GREENHOUSE SPECIES: *A. australis*, 15 to 20 ft., Tasmania; *Colensoi*, 4 to 5 ft., New Zealand; *Cooperi*, 20 to 30 ft., Queensland; *excelsa*, 'Norfolk Island Tree Fern', 60 to 80 ft., Norfolk Island; *quadripinnata*, 3 to 6 ft., W. Indies; *Rebecca*, 8 ft., Queensland.

Alstroemeria (Peruvian Lily)—*Amaryllidaceae* (or *Alstroemeriaceae*). Hardy and half-hardy tuberous-rooted perennials. First introduced mid-eighteenth century.

CULTURE: Soil, rich, moist. Position, sunny, well-drained border, or pots in cool greenhouse. Plant, Oct. Water freely in summer, moderately in winter.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep, in sandy soil, in pans in cold frame, March; division of roots, April or Oct.

SPECIES CULTIVATED: *A. aurantiaca*, orange, red and carmine, summer, 2 to 3 ft., Chile; *brasiliensis*, red, yellow and brown, summer, 3 to 4 ft., Brazil; *campaniflora* (syn. *Bomarea campaniflora*), green, summer, 4 to 5 ft., Brazil; *chilensis*, orange red, summer, 2 to 3 ft., Chile; *haemantha*, red, green and purple, summer, 2 to 3 ft., Chile; *Ligtu*, pale lilac or red and purple, $1\frac{1}{2}$ to 2 ft., Chile; *Pelegria*, 'Lily of the Incas', lilac, red and purple, summer, 1 ft., Chile, and var. *alba*, pure white; *psittacina* (syn. *A. pulchella hort.*), red, green and brown,

summer, 2 to 3 ft., Brazil; *versicolor*, purple, maroon and green, summer, 2 to 3 ft., Peru; *violacea*, violet-mauve, summer, 3 to 5 ft., Chile.

Alternanthera (Joy-weed)—*Amaranthaceae*. Half-hardy shrubby perennials, used for carpet bedding, foliage crimson red. Sometimes known as *Telanthera*. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, sunny beds outdoors, May to Sept. Plant, May, 2 in. apart. Lift in Sept.; store in pots or boxes in temp. 55° to 65° during winter.

PROPAGATION: By cuttings inserted in sandy soil, temp. 75°, March.

SPECIES CULTIVATED: *A. amoena*, leaves green, red and orange, 3 in., Brazil, and vars. *amabilis*, leaves orange-scarlet, *spectabilis*, and *rosea*; *Betzickiana*, pale yellow and red leaves, 2 to 3 in., Brazil, and vars. *aurea*, *aurea nana compacta*, *magnifica*, and *spathulata*; *versicolor*, leaves coppery red, 3 in., Brazil.

Althaea (Hollyhock)—*Malvaceae*. Hardy perennial plants. Hollyhock first introduced mid-sixteenth century.

CULTURE OF HOLLYHOCK: Soil, ordinary loamy, not too light. Trench three spits deep in Oct. and work in plenty of decayed manure. Mulch surface of soil. Support with stakes standing 6 ft. out of ground. Water copiously in dry weather. Young plants yield finest flowers for exhibition. Cut down to within 6 in. of soil after flowering.

CULTURE OF OTHER SPECIES: Soil, ordinary. Position, sunny borders. Plant, Oct. or March.

PROPAGATION: Hollyhocks by seeds sown on a south border in June, thin seedlings to 6 in. apart in July. On warm soils seedlings may be transplanted direct into flowering positions in Sept., in cold districts or on wet soils pot in autumn and winter in frames, planting in April. Sow seeds in good soil in temp. 55° to 65° in Jan. or Feb., grow in pots, harden off in April, and plant out in May. Cuttings of young shoots growing out of base of flower stems inserted singly in small pots plunged in a gentle hotbed in spring; cuttings of young shoots consisting of two joints with lower leaves removed, inserted in small pots placed in a close frame in Aug. Other species by seeds sown outdoors in April.

SPECIES CULTIVATED: *A. cannabina*, rose, June, 6 ft., Europe, and var. *narbonensis*, red; *ficifolia*, 'Fig-leaved Hollyhock', yellow, June, 6 ft., Siberia; *officinalis*, 'Marsh Mallow', rose, July to Aug., 3 to 4 ft., Britain; *rosea*, 'Hollyhock', rose, 5 to 6 ft., summer, China. Many single and double flowered varieties of garden origin, for which see trade catalogues. See *Hibiscus* for *A. frutex*.

Alum-root, see *Heuchera*.

Alyssum (Madwort)—*Cruciferae*. Hardy annual and perennial herbs and subshrubs mostly with grey foliage. The summer bedding plant known as 'Sweet Alyssum' is now classified in the genus *Lobularia*. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, open border or rockery. Plant, Oct. or April. Sow seeds of annuals where they are to grow.

PROPAGATION: By seeds for annuals; seeds and cuttings for perennials and subshrubs.

SPECIES CULTIVATED: *A. alpestre*, yellow, June, 3 in. Europe; *argenteum*, yellow, May to July, 1 ft., woody at base, Europe; *idaeum*, soft yellow, trailing, May to June, Crete; *Moellendorffianum*, yellow, June to July, 6 in., Bosnia; *montanum*, yellow, fragrant, summer, 2 to 4 in., Europe; *petraeum* (syn. *A. gemonense*), yellow, spring, 1 ft., woody at base, S. Europe; *pyrenaicum*, white, summer, 8 to 10 in., dwarf shrublet, Pyrenees; *saxatile*, 'Gold Dust', yellow, May, 1 ft., shrubby, Cent. and S. Europe; *spinosum*, white, June, 4 to 6 in., woody and spiny, S. Europe and N. Africa, and var. *roseum*; *Wulfenianum*, golden yellow, summer, 3 in. S. Europe.

Amaranth Feathers, see *Humea elegans*.

Amaranthus—*Amaranthaceae*. Half-hardy annuals. Foliage orange-red, crimson, green. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, sunny bed. Plant, June.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep, in temp. 55° to 60° , March; seedlings must be hardened off by easy stages, first on greenhouse shelf, then in frame, increasing ventilation until plants are well hardened before planting out.

SPECIES CULTIVATED: *A. caudatus*, (syns. *A. paniculatus* and *A. sanguineus*) 'Love-lies-Bleeding', 'Velvet Flower,' crimson-purple, summer, 2 to 3 ft., Tropics; *hybridus* var. *hypochondriacus*, 'Prince's Feather', crimson, summer, 4 to 5 ft., Tropics; *tricolor*, leaves carmine and yellow, India, less hardy than others, and vars. *splendens*, fine crimson foliage, best suited for pot culture in greenhouse and *salicifolius*, leaves willow-like.

Amaracus, see *Origanum*.

Amaryllis—*Amaryllidaceae*. Hardy bulbous plant. First introduced early eighteenth century. American authors consider the name *Amaryllis* should properly be applied to the American genus here called *Hippeastrum*; the Cape plant here called *Amaryllis Belladonna* is now known in America as *Callicore rosea* or *Brunsvigia rosea*.

CULTURE: Compost, sandy loam, enriched with leaf-mould and cow manure. Position, well-drained border, foot of south wall. Plant bulbs 9 in. deep and 12 in. apart in September. Water freely in dry weather whilst growing. Mulch with decayed manure in spring.

PROPAGATION: By offsets.

SPECIES CULTIVATED: *A. Belladonna*, 'Belladonna Lily', rose-red, fragrant, Aug. and Sept., 18 in., Cape Colony, and various colour forms. The flowers appear before the new leaves. For greenhouse amaryllis see *Hippeastrum*.

Amasonia—*Verbenaceae*. Stove evergreen flowering perennial.

CULTURE: Compost, equal parts loam and leaf-mould, little silver sand. Pot, March. Position, in small pots near glass, well exposed to light; shade in summer. Water freely in spring and summer, moderately other times. Temp., March to Sept. 70° to 85° , Sept. to March 58° to 65° .

PROPAGATION: By division of the plants in March.

SPECIES CULTIVATED: *A. calycina* (syn. *A. punicea*), yellow and red, Sept., 12 to 18 in., British Guiana; *erecta*, white and pink, July, 18 in., S. America.

Amelanchier—*Rosaceae*. Hardy spring-flowering trees and shrubs. Deciduous. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, open shrubbery. Plant, Nov. The leaves are prettily tinted in autumn. Easily grown small trees for the garden.

PROPAGATION: By seeds or layers in spring, or rooted offsets.

SPECIES CULTIVATED: *A. alnifolia*, white, April, 10 to 20 ft., N.W. America; *canadensis* (syn. *A. oblongifolia*), 'Snowy Mespilus', 'June Berry', 'Shadbush', white, April, 20 to 30 ft., N. America; *florida*, white, April, to 30 ft., N. America; *grandiflora*, a large-flowered hybrid making a small tree; *laevis*, white, May, 30 to 40 ft., N. America; *oblongifolia*, white, April, 6 to 20 ft., Eastern N. America; *ovalis* (syn. *A. vulgaris*), white, April, 15 to 20 ft., Europe; *stolonifera*, white, April, 4 to 5 ft., N. America.

American Aloe, see *Agave americana*; **-Cowslip**, see *Dodecatheon Meadia*; **-Cress** see *Barbarea*; **-Fox-grape**, see *Vitis Labrusca*; **-Ground Laurel**, see *Epigaea repens*; **-Ivy**, see *Parthenocissus quinquefolia*; **-Laurel**, see *Kalmia latifolia*; **-Swamp Laurel**, see *Kalmia glauca*; **-Wych-Hazel**, see *Fothergilla Gardenii*; **-Wood Lily**, see *Trillium grandiflorum*.

Ammobium—*Compositae*. Half-hardy annual, flowers valuable for cutting and drying for winter decoration. Gather when fully grown and hang head-downwards in a cool place. First introduced early nineteenth century.

CULTURE: Soil, light, rich. Position, warm border. Plant, May, 6 in. apart.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil, temp. 50° to 55°, March; or outdoors early in May.

SPECIES CULTIVATED: *A. alatum*, 'Everlasting Sand Flower', white, summer, 2 ft., Australia, *grandiflorum*, and var., with larger flowers.

Ammocharis—*Amaryllidaceae*. Tender bulbous plants.

CULTURE: As *Brunsvigia*.

PROPAGATION: As *Brunsvigia*.

SPECIES CULTIVATED: *A. coranica*, pink to carmine, 1 ft., S. Africa; *heterostyla*, white or pink, 6 to 12 in., Uganda, Kenya; *Tinneana* (syn. *Crinum Tinneanum*), pink to carmine or purplish red, W. Africa.

Amorpha—*Leguminosae*. Hardy deciduous flowering shrubs. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, in the mixed shrubbery. Plant, Oct. to Feb. Prune after flowering, thinning shoots that have borne blossoms.

PROPAGATION: By cuttings in autumn; layering in summer; suckers in winter; seeds sown in cold frame.

SPECIES CULTIVATED: *A. canescens*, 'Lead Plant', blue, July, 3 ft., Missouri; *fruticosa*, 'Bastard Indigo', bluish purple, July, 6 ft., Carolina.

Amorphophallus—*Araceae*. Stove tuberous-rooted perennials. Unpleasantly scented flowers with purple or white spathes and brown spadices appearing before leaves.

CULTURE: Compost, equal parts turfy loam, peat, leaf-mould, decayed manure and silver sand. Position, well-drained pots in shade. Pot moderately firmly in pots just large enough to take tubers in Feb. to March, transfer to larger pots or tubs in April or May. Water moderately Feb. to April and Sept. to Nov.; freely April to Sept.; keep quite dry Nov. to Feb. Temp., Feb. to Sept. 70° to 80°, Sept. to Nov. 65° to 75°, Nov. to Feb. 55° to 65°.

PROPAGATION: By dividing the tubers in Feb. or March; by seeds sown in sandy soil, temp. 75°.

SPECIES CULTIVATED: *A. campanulatus* (syn. *A. virosus*), purple spathe, India; *Titanum*, purple spathe, very large, Sumatra.

Ampelopsis—*Vitaceae*. Fast-growing and ornamental, climbing, hardy deciduous shrubs, foliage brilliantly coloured in the autumn. Virginia Creeper, formerly included here, has been transferred to the genus *Parthenocissus*.

CULTURE: Soil, ordinary. Grown against walls and trellises. Plant Oct. to March.

PROPAGATION: By hardwood cuttings made in September and stored for planting outdoors in spring; softwood cuttings struck in frames in summer.

SPECIES CULTIVATED: *A. aconitifolia*, slender graceful vine, China; *arborea*, 'Pepper Vine', leaves dark green, colouring pale rose, U.S.A.; *brevipedunculata*, vigorous climber, N.E. Asia; *Delavayana*, vigorous, young growth reddish and hairy, China.

Amphicome—*Bignoniaceae*. Half-hardy perennial herbs, sometimes woody at base. Allied to *Incarvillea* and sometimes included in that genus.

CULTURE: Compost, two parts loam, one part of equal proportions of leaf-mould, decayed manure, and silver sand. Position, pots in cool greenhouse. Pot in Oct. or March. Water freely in summer, keep nearly dry in autumn and winter.

PROPAGATION: By seeds sown in a temp. of 55° in spring; cuttings of half-ripened shoots in summer.

SPECIES CULTIVATED: *A. arguta*, red, Aug., 1 ft.; *emodi* (syn. *Incarvillea emodi*), rose and orange, Aug. to Oct., 1½ ft., Himalaya.

Amsonia—*Apocynaceae*. Hardy herbaceous perennial.

CULTURE: Soil, ordinary. Position, sunny.

PROPAGATION: Seed or division.

SPECIES CULTIVATED: *A. Tabernaemonta*, blue, summer, 1 to 2 ft., Eastern U.S.A.

Amygdalus, see *Prunus*.

Anacampseros—*Portulacaceae*. Greenhouse succulent-leaved plant.

CULTURE: Compost, two parts sandy loam, one part of equal proportions of old mortar, small brick rubble and sand. Position, in not too large pots on shelves near the glass; no shade. Water moderately in spring and summer, keep nearly dry in autumn and winter. Dry atmosphere needed. Repot in March. Temp., 45° to 50° in winter, 50° to 60° in summer.

PROPAGATION: By seeds sown in a mixture of fine rubble and sandy loam, in heat, in spring; by cuttings, exposed to the air for a few days after removal from the plant, then inserted in fine sand in a gentle heat.

SPECIES CULTIVATED: *A. albissima*, white, S. Africa; *arachnoides*, pink, July, 12 to 18 in., S. Africa; *filamentosa*, pink, Sept., 1 ft., S. Africa; *lanceolata*, reddish, S. Africa; *papyracea*, yellow, S. Africa; *Telephiastrum*, pink, summer, 1 ft., S. Africa; *tomentosa*, bright red, S. Africa.

Anacamptis—*Orchidaceae*. *A. pyramidalis* is the correct name for the English orchid known as *Orchis pyramidalis*, q. v.

Anacardium—*Anacardiaceae*. Stove evergreen tree widely cultivated in Tropics for its edible nuts. First introduced late seventeenth century.

CULTURE: Soil, light, loamy. Position, borders in warm house. Temp., March to Sept. 75° to 85°, Sept. to March 65° to 75°. Water freely during summer.

PROPAGATION: By cuttings of ripened wood, in sandy soil, under hand-glass, in warm house.

SPECIES CULTIVATED: *A. occidentale*, 'Cashew Nut', yellow and red fruit with edible kernel, 30 to 40 ft., Trop. America.

Anacharis (Water Thyme)—*Hydrocharitaceae*. Useful oxygenating plants for pond or aquarium with narrow thyme-like leaves. It was a great pest when first introduced from N. America in 1847 but is now less vigorous.

CULTURE: Soil, aquarium compost or loam. Plant any time during spring or summer, weight clumps with lead or stone and sink in position.

PROPAGATION: Slips taken any time during growing season.

SPECIES CULTIVATED: *A. canadensis* (syn. *Elodea canadensis*), 'Canadian Water Weed', small white flowers, N. America.

Anacyclus (Mount Atlas Daisy)—*Compositae*. Perennial rock garden plants.

CULTURE: Soil, light sandy, gritty loam or scree mixture. Position, full sun, deep pocket or scree.

PROPAGATION: Seeds sown in cold frame in light, gritty soil in early spring; as the seeds are difficult to identify, the whole seed head should be rubbed up and sown chaff and all.

SPECIES CULTIVATED: *A. atlanticus*, white, spring to summer, prostrate, Morocco; *depressus*, white, backs of petals crimson, spring and summer, prostrate, N. Africa.

Anagallis (Pimpernel)—*Primulaceae*. Hardy trailing annuals and perennials.

CULTURE: Soil, light, rich. Position, sunny, well-drained borders for annuals; moist and boggy places for perennials.

PROPAGATION: Annuals by seeds sown $\frac{1}{2}$ in. deep in temp. 65° March, transplanting seedlings outdoors in June; perennials by division of roots in March; seeds sown outdoors in April.

ANNUAL SPECIES: *A. fruticosa*, vermillion, May to Aug., 2 ft., Morocco; *indica*, blue, July, 1 ft., India.

PERENNIAL SPECIES: *A. linifolia* (syn. *A. grandiflora*), blue, July, 1 ft., Europe, and vars. *collina* and *Monellii*; *tenella*, rosy, July and Aug., Britain.

Ananas—*Bromeliaceae*. Stove evergreen plants, bearing the well-known pineapple fruits. First introduced mid-seventeenth century.

CULTURE: Compost, two parts decomposed fibrous loam, one part well-decayed manure, one part $\frac{1}{2}$ in. bones and pounded oyster shells. Position, pots plunged in a tan hotbed in stove facing south. Temp., Sept. to March 65° to 75°.

March to Sept. 75° to 90°. Full exposure to sun essential. Water moderately in winter, freely in summer. Moist atmosphere most essential in spring and summer, and a slightly dry one in winter. When fruit begins to ripen withhold water. Supply plants in fruiting pots freely with liquid manure. Plants come into bearing when two years old.

PROPAGATION: By suckers, or crowns of fruit inserted in small pots in temp. 80°, spring.

SPECIES CULTIVATED: *A. comosus* (syn. *A. sativus*), 'Pineapple', 3 ft., Trop. America, and its vars. *variegatus*, leaves striped, and *Porteanus*, leaves with central yellow band.

Anaphalis—*Compositae*. Hardy perennials, with 'everlasting' flowers.

CULTURE: Soil, ordinary. Position, sunny borders. Plant in Oct. or March.

PROPAGATION: By division in autumn or spring; seeds sown outdoors in April.

SPECIES CULTIVATED: *A. cinnamomea*, white flowers and foliage, cinnamon-scented, July to Sept., 1 to 2 ft., shrubby, China and Japan; *margaritacea*, 'Pearly Everlasting', white, July and Aug., 1 ft., N. America; *triplinervis*, 12 to 18 in., white, downy leaves, Himalaya.

Anastatica—*Cruciferae*. Half-hardy annual. In its native country possesses the peculiar property of withering up in dry weather, and when rain comes of spreading itself out again, as though alive.

CULTURE: Soil, ordinary. Sow seeds in a cold frame in spring and plant in sunny border in May. Usually purchased as plants in a dry ball.

SPECIES CULTIVATED: *A. hierochuntica*, 'Rose of Jericho', 'Resurrection Plant', white, summer, 1 ft., Orient.

Anchusa (Alkanet, Bugloss)—*Boraginaceae*. Hardy biennials and perennials. The plant formerly known as *A. myosotidiflora* is now classified as *Brunnera macrophylla*, and *A. sempervirens* as *Pentaglottis sempervirens*.

CULTURE: Soil, ordinary. Position, sunny borders. Plant, Oct. or March. The well-known Dropmore, Opal, etc., are forms of *A. azurea*.

PROPAGATION: By seed; root cuttings in Feb.; division in Oct. for perennials; biennials, by seed in sandy soil in temp. 55° to 65° in March or outdoors in April.

SPECIES CULTIVATED: *A. azurea* (syn. *A. italica*), perennial, blue, July, 3 to 4 ft., S. France; *Barrelieri*, perennial, blue and white, June, 2 ft., Europe; *caespitosa*, gentian blue, May to August, 15 in., Crete; *capensis*, biennial, blue, July, 12 to 18 in., S. Africa; *officinalis*, biennial or perennial, rich blue, 1 to 2 ft., Europe.

Anchor Plant, see *Colletia cruciata*.

Andromeda—*Ericaceae*. Hardy evergreen flowering shrub.

CULTURE: Soil, boggy peat. Position, moist, shady borders or beds. Plant, Oct. No pruning required except to cut away dead wood.

PROPAGATION: By layering shoots in Sept.; seeds sown in peaty soil in a cold frame.

SPECIES CULTIVATED: *A. polifolia*, 'Marsh Rosemary', pink, June, 1 ft., N. Temp. Regions, including Britain, and vars. *angustifolia*, *rosmarinifolia*, *major*, also *compacta*, a delightful form for the rockery. See *Pieris*, *Leucothoe* and *Zenobia* for other species formerly included in this genus.

Andropogon (Beard Grass)—*Gramineae*. Hardy ornamental flowering grass.

CULTURE. Soil, ordinary, light, and dry. Position, sunny border. Plant, Oct., March and April. Apply liquid manure occasionally in summer.

PROPAGATION: By division.

SPECIES CULTIVATED: *A. furcatus*, to 6 ft., N. America.

Androsace (Rock Jasmine)—*Primulaceae*. Hardy perennial alpine plants. First introduced mid-eighteenth century.

CULTURE: For general purposes in the rock garden, sandy loam and leaf-mould with sharp grit added generously. Plant, March or April. For those

species best suited for alpine house or cold frame cultivation, loam, leaf-mould, sand and sharp grit in equal proportions.

PROPAGATION: By seeds sown in sandy gritty soil in pans; cuttings in sandy soil in frames in spring; division of roots in spring.

SPECIES CULTIVATED: *A. alpina*, pink, summer, 1 in., Europe; *carnea*, pink, June to July, 3 in., Europe, var. *Laggeri*, pink, March to April, more densely tufted; *Chamaejasme*, white, May to June, 3 in., Europe and N. America; *ciliata*, rose-pink, June, 2 in., Pyrenees; *cylindrica*, milk-white, May to June, 2 in., Pyrenees; *helvetica*, pink, fading to white, June to July, 1 in., Europe; *hirtella*, white, May to June, 1 in., Pyrenees; *imbricata*, white, June, 1 in., Alps; *lactea*, white, yellow-eyed, June to Aug., 6 in., Switzerland, Transylvania; *lactiflora* (syn. *A. coronopifolia*), bluish-white, biennial, June to Aug., 6 in., Siberia; *lanuginosa*, rose, July, 6 in., Himalaya, var. *Leichtlinii*, white, crimson-eyed; *mucronifolia*, pink, June to July, 3 in., Kashmir; *pubescens*, white, May to June 2 in., Alps; *pyrenaica*, white, May to June, 1 in., Pyrenees; *sarmentosa*, rose, May, 3 to 4 in., Himalaya, vars. *Chumbyi*, more brightly coloured, *Watkinsii*, bright rose-red, 6 in.; *sempervivoides*, rose-red, May, 3 in., Himalaya; *villosa*, white, golden-eyed, 3 in., Europe, var. *arachnoidea*, white, June to July, 1 in., E. Europe; *Wulfeniana*, bright rose-red, April to May, 1 in., E. Alps.

Andryala—*Compositae*. Evergreen silver-leaved sub-shrubs.

CULTURE: Soil, light sandy loam, well drained. Position, sunny, sheltered.

PROPAGATION: Seeds in cold frame; cuttings in late summer in cold frame.

SPECIES CULTIVATED: *A. Agardhii*, yellow, all summer, 9 to 12 in., Spain.

Aneimia (Flower-fern; Ash-leaf Fern)—*Schizaeaceae*. Stove and greenhouse ferns. First introduced late eighteenth century. Some authorities use the name *Anemidictyon* in place of *Aneimia*.

CULTURE: Compost, equal parts loam, peat, leaf-mould, sand and charcoal. Position, shady, moist; useful for wardian cases. Pot, Feb., March. Water freely spring and summer, moderately other times. Temp., stove, March to Sept. 70° to 85°, Sept. to March 60° to 65°; greenhouse, March to Sept. 55° to 60°, Sept. to March 45° to 50°.

PROPAGATION: By spores similar to *Adiantum*.

STOVE SPECIES CULTIVATED: *A. adiantifolia*, 12 to 18 in., Trop. America; *collina*, 8 to 12 in., Brazil; *Dregeana*, 9 in., Natal; *rotundifolia*, 6 to 9 in., Brazil.

GREENHOUSE SPECIES CULTIVATED: *A. phyllitidis*, 1 ft., Cuba, Peru; *tomentosa* (syn. *A. chelanthoides*, *A. deltoides* and *A. flexuosa*), 1 to 2 ft., Mexico, etc.

Anemone (Windflower)—*Ranunculaceae*. Hardy herbaceous and tuberous-rooted perennials. Certain species have been placed in the genus *Hepatica*, and some authors separate the *Pulsatilla* section as an independent genus. The Japanese *Anemones* of gardens are hybrids of *A. hupehensis* var. *japonica* and *A. vitifolia*, now known as *A. hybrida*.

CULTURE: Soil, good ordinary, well enriched with decayed manure. Position, sunny or partly shady borders. Plant, autumn or spring.

Culture of *A. coronaria*, *fulgens*, and *hortensis*: Soil, moderately light, liberally mixed with leaf-mould and decayed manure. Position, partly shaded beds or borders. Plant tubers 3 in. deep and 6 in. apart in Oct., Nov., or Feb. to March. Lift tubers when foliage dies and store away in cool place till planting time; or in well-drained soils leave undisturbed until crowding indicates the need for lifting, separating and replanting.

PROPAGATION: Herbaceous species, by seeds in sandy soil in cold frame in spring; division of roots Oct. or March; root cuttings in spring. Tuberous-rooted species by seeds sown in prepared beds of above soil in Jan. or Feb. or in July.

SPECIES CULTIVATED: *A. albana*, white to pale blue, May, 12 in., N. Asia; *alpina* (syns. *A. acutipetala*, *Pulsatilla alpina*), white, May, 12 to 18 in., Europe, var. *sulphurea*, soft yellow; *apennina*, blue, rose and white, March, 6 in., Europe (Br.), and numerous wild and garden varieties; *baldensis*, white, tinged pink,

May to June, 6 in., Europe; *blanda*, blue, Jan. to March, 6 in., Asia Minor; *canadensis* (syn. *A. dichotoma*), white, June, 2½ ft., E.N. America; *coronaria*, 'Poppy Anemone', various, spring, 9 to 12 in., S. Europe; *demissa*, white, summer, 9 in., E. Asia; *Fanninii*, white, June, 3 to 4 ft., Natal; *fulgens*, 'Scarlet Windflower', scarlet, May, 1 ft., S. Europe; *glaucofolia*, bluish-lilac, summer, 1 to 3 ft., W. China; *Halleri* (syn. *Pulsatilla Halleri*), lilac, June, to 6 in., Switzerland; *hortensis* (syn. *A. stellata*), various, spring, 1 ft., S. Europe; *hybrida* (syn. *A. elegans*), 'Japanese Windflower', rose, 2 to 5 ft., hybrid, many named varieties from white to red; *hupehensis* (syn. *A. japonica* var. *hupehensis*), rose, summer, 1½ to 2 ft., Cent. and W. China, var. *japonica*, semi-double, naturalised in Japan; *multifida*, yellow to purple, 6 to 18 in., S. America; *narcissiflora*, white to pink, occasionally yellow, May to June, 1 ft., Mts. of Europe; *nemorosa*, 'Wood Anemone', white, March, 6 in., Britain, and vars. *alba*, *Allenii*, *major*, *Robinsoniana*, etc.; *palmata*, white and yellow, May, 6 in., Mediterranean; *patens* (syn. *Pulsatilla patens*), purple to white, May to June, 12 in., Europe, N. Asia, etc.; *pavonina*, various, to 1 ft., Balkan Peninsula, Asia Minor, and vars. *typica*, plain scarlet, *ocellata*, scarlet with yellow eye, *purpureo-violacea*, violet or rose; *Pulsatilla* (syn. *Pulsatilla vulgaris*), 'Pasque Flower', purple, April, 1 ft., Europe (Br.), and numerous named varieties; *ranunculoides*, golden yellow, March, 9 to 12 in., Europe (Br.), Siberia; *rivularis*, white, May, 2 ft., Himalaya; *rupicola*, white, May to June, 12 in., Himalaya; *sylvestris*, 'Snowdrop Windflower', white, April, 1 ft., Europe; *tetrasepala*, white, May to June, 2 to 4½ ft., N. India; *tomentosa* (syns. *A. japonica* var. *tomentosa*, *A. hupehensis* var. *tomentosa*), rose, July to Sept., 3 to 5 ft., W. China; *trifolia*, white, spring, 6 in., S. Europe, var. *caerulescens*, bluish; *vernalis* (syn. *Pulsatilla vernalis*), purple, white outside, May, 6 to 9 in., Europe; *vindobonensis*, pale yellow, 6 in., March, hybrid; *vitifolia*, white, summer, 3 to 4 ft., tender, N. India, N.W. China.

Anemonella—*Ranunculaceae*. One perennial herb with tuberous roots, sometimes included in the genus *Anemone*.

CULTURE: Soil, light moist. Position, partly shady.

PROPAGATION: By division of roots in spring or autumn.

SPECIES CULTIVATED: *A. thalictroides* (syn. *Anemone thalictroides*, *Synedemon thalictroides*), 'Rue Anemone', white to pink, spring, 4 to 12 in., E.N. America.

Anemonopsis—*Ranunculaceae*. Hardy herbaceous perennial. First introduced mid-nineteenth century.

CULTURE: Soil, deep rich loam. Position, well-drained and partially shaded border. Plant, Oct., March.

PROPAGATION: By division of roots in Oct. or March; seeds sown in heat in March, planting seedlings out in May.

SPECIES CULTIVATED: *A. macrophylla*, lilac and purple, June and July, 2 to 3 ft., Japan.

Anemopsis (Apache Beads)—*Saururaceae*. One perennial aquatic herb. Aromatic rootstocks used medicinally and strung into necklaces as beads.

CULTURE: Soil, loamy. Position, shallow water or wet soil. Plant, spring.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *A. californica*, 'Yerba Mansa', 18 in., rounded leaves, white anemone-like flowers, California.

Anethum—*Umbelliferae*. Annual or biennial herbs. One species grown for seeds which are used for flavouring.

CULTURE OF DILL: Sow in April in a warm open situation in a good garden soil. Cut down when seeds begin to ripen and thresh when ripe.

SPECIES CULTIVATED: *A. graveolens* (syn. *Peucedanum graveolens*), 'Dill', yellow, summer, to 3 ft., Europe.

Angelica—*Umbelliferae*. Perennial herbaceous herb used for flavouring confectionery and liquors, and root candied for cake decoration.

CULTURE: Soil, deep, moist loam. Position, shady.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in March where plants are to remain. When seedlings are 3 in. high, thin them to 6 in. apart.

SPECIES CULTIVATED: *A. Archangelica*, 'Holy Ghost', green, July, 4 to 5 ft., Europe; *sylvestris*, white, to 4 ft., Cent. Europe.

Angelonia—*Scrophulariaceae*. Stove and greenhouse herbaceous perennials. First introduced early nineteenth century.

CULTURE: Compost, equal parts of loam, peat, leaf-mould and a little sand. Position, pots in sunny parts of stove or greenhouse. Pot, March. Water freely March to Oct., moderately afterwards. Temp., March to Oct. 65° to 75°, afterwards 55° to 60° for stove species; March to Oct. 55° to 65°, Oct. to March 45° to 55° for greenhouse kinds.

PROPAGATION: By division of roots in March; cuttings of young shoots inserted in sand under bell-glass, in temp. 75° in April; seeds sown in sandy soil in spring in temp. 65° to 70°.

STOVE SPECIES CULTIVATED: *A. salicariifolia*, blue, Aug., 2 ft., S. America.

GREENHOUSE SPECIES CULTIVATED: *A. grandiflora*, lilac, 1½ to 2 ft., S. America.

Angel's Tears, see *Narcissus triandrus* var. *albus*; **-Trumpet**, see *Datura suaveolens*.

Angiopteris—*Marattiaceae*. Greenhouse, evergreen tree ferns.

CULTURE: Compost, equal parts peat, loam, leaf-mould, sand and charcoal. Pot, Feb., March. Position, pots or tubs, standing in 3 in. of water in shade. Water freely in spring and summer, moderately other times. Temp., March to Sept. 55° to 60°, Sept. to March 45° to 50°.

PROPAGATION: By offsets only.

SPECIES CULTIVATED: *A. evecta*, 10 to 15 ft., Ceylon and Pacific Isles; *Teysmanniana*, grows fronds of great length, 6 ft. being small, evergreen, Java.

Angola Hemp, see *Sansevieria*.

Angraecum—*Orchidaceae*. Stove epiphytal orchids, flowers fragrant in some species. Under later revision the genus has been divided into several sections which have been given generic titles. In cultivation all are known as Angraecums.

CULTURE: Compost, equal parts osmunda fibre and sphagnum moss with nodules of charcoal or finely crushed potsherds, larger for the stronger growing species. Position, shady, in suspended baskets or well-drained pans, expose to light in autumn. Pot March. Water freely March to Oct., moderately afterwards. Temp., Sept to March 65° to 70°, March to Sept. 70° to 85°. Resting period, though many differences are present in habit, must not be drastic, the compost should approach dryness in winter between waterings. Flower spikes appear in axils in the leaved species, from the 'crown' in the leafless species, from the leaf axils or opposite them in the scandent-habited species. In a few the flowers are solitary on slender peduncles from near the base.

PROPAGATION: The stems being short in many species, and basal growths very seldom emitted, propagation can seldom be effected with the majority. The scandent-growing species, which should be placed on rafts, are readily propagated by severing the stems with three or four nodes below roots and allowing the division to remain on the raft till growth is seen.

SPECIES CULTIVATED: Dwarf or moderate size—*A. arcuatum*, white, spring, S. Africa; *articulatum*, white, May and June, 8 to 12 in., Madagascar; *bilobum*, white or rose tinged, spur orange, autumn, W. Africa; *caudatum*, white, Aug., 12 to 15 in., Trop. Africa; *citratum*, lemon-yellow, spring, 6 to 8 in., Madagascar; *Ellisii*, white, winter, 1 ft., Madagascar; *falcatum*, white, summer, 4 to 6 in., Japan; *gracilipes*, white, borne singly, various, Madagascar; *Humboldtii*, white, spring, 8 to 10 in., Madagascar; *Kotschyi*, white, spurs 10 in., autumn, Trop. E. Africa; *rhodostictum*, white, column vivid scarlet, summer, ht. various, W. Africa; *Rothschildianum*, white and green, black or sepia round spur mouth, autumn, Uganda; *Scottianum*, white, spring, 1 ft., Comoro Islands; Scandent species—*A. Eichlerianum*, white and green, solitary or in twos, summer, autumn, W. Africa

Germinyanum, white, lip protracted into a tail, summer, Madagascar; *infundibulare* very large, one or two, white, green tinged, summer, autumn, W. Africa. Extra large growing species—*A. eburneum*, white, tinged green, large, on stout spikes, spurs green, Bourbon Isles; *sesquipedale*, white, 5 to 8 in. across, spur 11 in. long, 3 ft., late autumn, Madagascar.

Anguloa (Cradle Orchid)—*Orchidaceae*. Terrestrial orchids with large, fragrant, tulip-shaped flowers borne singly on bracteate scapes, with the new growths. First introduced early nineteenth century.

CULTURE: Compost, three parts good loam fibre, one part peat or osmunda fibre and a little sphagnum moss, with crushed potsherds, well mixed. Ample drainage. Position, pots in shady part of house. Pot when new growth begins. Water freely May to Sept., very seldom afterwards. Temp., April to Sept. 60° to 75°, by sun heat, Sept. to March 55°. Resting period, winter. With care in winter will withstand lower temperatures. The plicate leaves should never be syringed.

PROPAGATION: By division of large plants when repotting. When 5 bulbs or more are present, the rhizome may be severed behind the fourth bulb and the fifth then often produces a growth.

SPECIES CULTIVATED: *A. brevilabris*, much like *Ruckeri*, but smaller, greenish and dull red, summer, Peru; *Cliftonii*, large, lemon and golden, splashed with crimson-purple, lateral sepal tips attenuated and much curved, spring, Peru; *Clowesii*, yellow, May, 18 in., Colombia; *Rolfei*, a natural hybrid between *brevilabris* and *Cliftonii*, spring and early summer, Peru; *Ruckeri*, yellow and crimson, May, 18 in., Colombia, var. *sanguinea*, crimson colour deeper and on a larger area; *uniflora*, cream, white, often pink-spotted, May, 2 to 3 ft., Colombia.

× **Angulocaste**—*Orchidaceae*. Bigeneric hybrid between *Anguloa* and *Lycaste*.

Anhalonium, see *Ariocarpus*.

Animated Oat, see *Avena sterilis*.

Anigozanthos—*Amaryllidaceae*. Greenhouse herbaceous perennials. First introduced early nineteenth century.

CULTURE: Compost, one part loam, two parts peat, and one part silver sand. Pot in March. Position, pots in cool greenhouse fully exposed to light. Water freely in spring and summer, moderately in autumn and winter. Temp., 40° to 50° in winter, no heat at other times.

PROPAGATION: By division of the roots in spring.

SPECIES CULTIVATED: *A. flavidus*, scarlet, June, Australia; *Manglesii*, green and red, July, 3 ft., Australia; *pulcherrimus*, yellow and white, May, 2 ft., Australia; *rufus*, purple, June, 2 ft., Australia.

Ania—*Orchidaceae*. Intermediate greenhouse orchids, also known as *Tainia* and *Ascotainia*.

SPECIES CULTIVATED: *A. Hookeriana*, pale yellow streaked reddish brown, Feb. to March, to 3 ft., E. Himalaya, N. Siam; *penangiana*, very similar, Malaya.

Anise, see *Pimpinella Anisum*; **Star-**, see *Illicium verum*.

Anisostichus—*Bignoniaceae*. Slightly tender, vigorous, evergreen climber, not fully hardy but makes a wall plant in mild areas. Related to *Campsis* and *Tecoma*, and sometimes listed as *Bignonia*.

CULTURE: Soil, loamy. Position, south wall.

PROPAGATION: By cuttings of young shoots in well-drained soil in temp. 65° to 70°, in April.

SPECIES CULTIVATED: *A. capreolatus*, (syn. *Bignonia capreolata*) 'Cross Vine', orange-red funnel-shaped flowers, summer, to 40 ft., N. America.

Annatto, see *Bixa Orellana*.

Annona—*Annonaceae*. Stove, fragrant-leaved, evergreen shrubs cultivated for their edible fruits. First introduced late seventeenth century.

CULTURE: Compost, two parts loam, one part peat, and a little silver sand. Pot, March or April. Position, light and sunny. Water freely March to Oct., moderately afterwards. Syringe daily April to Sept. Shade from bright sunshine. Temp., March to Oct. 70° to 80°, Oct. to March 55° to 65°.

PROPAGATION: By seeds in spring, or by cuttings of firm shoots in moist sand under bell-glass in temp. 75° in summer.

SPECIES CULTIVATED: *A. Cherimola*, 'Cherimoyer', brown, Aug., 12 to 18 ft., Trop. America; *muricata*, 'Sour Sop', yellow, summer, 10 ft., fruits edible, Trop. America; *palustris*, 'Alligator Apple', yellow, summer, 10 ft., Trop. America; *reticulata*, 'Custard Apple', yellow and brown, summer, 15 to 18 ft., fruits edible, Trop. America; *squamosa*, 'Sweet Sop', white, summer, 15 to 20 ft., fruits edible, W. Indies.

Anoectochilus (Jewel Orchid)—*Orchidaceae*. Terrestrial orchids. *Anoectochilus* is commonly applied to species of different genera and is so kept in this work. *Cystorchis*, *Dossinia*, *Erythroides*, *Eurycentrum*, *Haemaria*, *Hetaetia*, *Macodes* and other titles are not likely to come into general use. The leaves are the attraction, the flowers being of minor interest. Variation exists, the stems may be fleshy and noded, in others swollen. Though terrestrial in general, the roots do not penetrate the soil, the plants forming colonies in suitable debris and conditions.

CULTURE: A warm, moist, sweet atmosphere, not falling below 65° or 70° in winter is essential and but little higher in summer. Shading is necessary, draughts must be avoided. Compost of osmunda or good peat fibre, the same bulk of sphagnum and a little sand and charcoal nodules. Well-drained small pans are preferable and the compost should be slightly mounded centrally. A south-western or western aspect is desirable. If a small case or large bell-glass can be given in a greenhouse, a more equable temperature can be maintained, but air must be admitted whenever conditions allow.

PROPAGATION: All the species which emit stem roots should be propagated in spring and summer, cut the stems below roots, near the plant base. If available, a case with bottom heat should be used. Stronger plants are obtained if the flower spikes are pinched out when seen. *A. discolor* and similar swollen-stemmed forms may be increased by division of the rhizomes in early spring. Usually two or three swollen stems may be obtained on the same piece of rhizome; single pieces with a piece of the rhizome and a growth will succeed.

SPECIES CULTIVATED: *A. argyroneurus*, olive, veins silvery, Java; *concinus*, olive, veins golden, Assam; *Dawsonianus*, velvety olive, veins copper, Malay Archipelago; *Heriotii*, reddish, veins golden, India; *hieroglyphicus*, green, veins silvery, Assam; *regalis*, velvety green, veins golden, Ceylon; *setaceus*, velvety green, veins gold, Java; *Bohnhofianus*, large, olive green with golden reticulation, New Guinea; *Rollissonii*, large, rich green-shaded bronze, margined, striped and blotched pale yellow; *Sanderianus*, large, velvet-green with copper-red veins, New Guinea; *Petola*, easily grown, veined and reticulated with gold, Java. Numerous other species or forms may be found in specialists' catalogues.

Anomalesia—*Iridaceae*. Cormous plants formerly included in *Antholyza*.

CULTURE: Soil, light sandy. Position, sunny well-drained borders or pots in cool greenhouse. Plant in Oct. Lift in August, dry and store in a cool place till planting time.

PROPAGATION: By offsets; seeds in slight heat in spring.

SPECIES CULTIVATED: *A. Cunonia* (syn. *Antholyza Cunonia*), scarlet, July, 1 to 1½ ft., Cape.

Anomatheca, see *Lapeirousea*.

Anopterus—*Saxifragaceae*. Greenhouse, evergreen flowering shrub. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Pot and prune, March. Position, sunny greenhouse. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°. Water moderately in winter, abundantly at other times.

PROPAGATION: By cuttings of firm shoots 3 in. long, in sandy peat under bell-glass in temp. 65° in summer.

SPECIES CULTIVATED: *A. glandulosus*, 'Tasmanian Laurel', white or pink, April, 2 to 3 ft., Tasmania.

Ansellia—*Orchidaceae*. Epiphytic and semi-epiphytic evergreen orchids distributed through Africa, south-east and west. Several species have been described but they are now considered variants of two types, perhaps only one. All with more or less tall, cylindrical, stem-like pseudo-bulbs, leafy on their upper halves. Prevailing floral colours yellow and brown. Spikes terminal, often branched and many-flowered.

CULTURE: Compost three parts of osmunda or peat fibre, one part sphagnum moss, a little loam fibre and finely broken potsherds. Summer temperatures may reach the tropical, particularly for the West African forms. Winter, 60° to 65°, with occasional waterings. Exposure to light should be given in autumn. Water must not be allowed to lodge in new growths.

PROPAGATION: By division of plants with eight or more bulbs.

SPECIES CULTIVATED: *A. africana*, light yellow and red-brown, winter, Sierra Leone; *confusa*, pale yellow or creamy-white, spotted brown-purple, winter, W. Africa; *congoensis*, yellow with nearly confluent red-brown blotches, various, Congo, W. Africa; *nilotica*, larger and brighter in colour, winter, E. Africa; *gigantea*, pale yellow and red-brown, autumn and winter, Natal.

Antennaria—*Compositae*. Hardy herbaceous perennials with silvery-white leaves; useful for carpet bedding, edgings to borders or clothing dry spots.

CULTURE: Soil, ordinary. Position, sunny borders or rockeries. Plant, March or Oct.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *A. aprica*, white or soft pink, June, 4 in., America; *dioica*, pink, June, 3 in., Europe incl. Britain; *rosea*, pink, 8 to 16 in., W.N. America.

Anthemis—*Compositae*. Hardy perennials with fully-cut, strongly-scented foliage. Flowers of the common chamomile, *A. nobilis*, are used for making chamomile tea.

CULTURE: Soil, ordinary. Position, sunny borders for tall species, rock garden for dwarf ones. Plant, October or March, common chamomile to be planted 2 ft. apart in rows 30 in. asunder in April. Gather flowers when fully expanded.

PROPAGATION: By division in March, seeds sown outdoors in April, cuttings of young growth in spring.

SPECIES CULTIVATED: *A. Biebersteiniana*, rich yellow, leaves filigree silver, June to July, 6 in., Orient; *Cupaniana*, white, all summer, 1 ft., Italy; *macedonica*, white, June, 6 to 9 in., Macedonia; *nobilis*, 'Common Chamomile', white, Aug., 1 ft., Europe; *Sancti-Johannis*, rich orange, summer, 12 to 18 in., Bulgaria; *tinctoria*, 'Dyer's' or 'Ox-eye Chamomile', yellow, Aug., 2 ft., Europe.

Anthericum—*Liliaceae*. Hardy herbaceous perennials.

CULTURE: Soil, light, rich. Position, partially shaded borders. Plant, Oct., Nov.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in cold frame in Sept. or March; division of roots in Oct.

SPECIES CULTIVATED: *A. Liliago*, 'St. Bernard Lily', white, July and Aug., 12 to 18 in., S. Europe, var. *major*, a superior form; *ramosum*, white, June to Aug., 2 ft., S. Europe. See the genera *Paradisea* and *Chlorophytum* for other species formerly included in this genus.

Anthogonium—*Orchidaceae*. Usually terrestrial. Only one species seems to have appeared in cultivation. Pseudo-bulbs small, carrying two or three grass-like leaves. Flowers somewhat tubular, scapes erect.

CULTURE: Compost, three parts of fibre, two parts loam and sphagnum moss.

Temp., summer 60° and upwards, expose to light in autumn; winter 55°. Very occasional waterings if any.

PROPAGATION: By separating pseudo-bulbs.

SPECIES CULTIVATED: *A. gracilis*, rosy, as are the pedicels and ovaries, late summer, Burma, N. India.

Antholyza (Aunt Eliza)—*Iridaceae*. Cormous plants. Species formerly included here have been transferred to other genera, *Anomalesia*, *Chasmanthe*, *Curtonus* and *Petamenes*.

CULTURE: Soil, light sandy. Position, sunny well-drained borders or pots in cool greenhouse. Plant in Oct. Lift in Aug., dry and store in cool place till planting time.

PROPAGATION: By offsets; seeds in slight heat in spring.

SPECIES CULTIVATED: *A. ringens* (syn. *Babiana ringens*), crimson and greenish-yellow, summer, 1 to 1½ ft., a very remarkable plant, the upper part of the flower-stalk being flowerless and serving in its native habitat as a perch for sunbirds as they suck the nectar and pollinate the curiously-shaped blooms.

Anthony Nut, see *Staphylea pinnata*.

Anthoxanthum—*Gramineae*. Hardy perennial flowering grass. Inflorescence has the odour of newly mown hay, and is useful for winter bouquets.

CULTURE: Soil, ordinary. Plant, Oct. or March. Position, open border.

PROPAGATION: By seeds sown ¼ in. deep where plants are to grow in April; division of roots, Oct. or March.

SPECIES CULTIVATED: *A. odoratum*, 'Sweet Vernal Grass', 1 ft., Europe.

Anthriscus—*Umbelliferae*. Annual or perennial herbs grown for leaves which are used like parsley. First introduced mid-seventeenth century.

CULTURE: Seed germinates readily but will not transplant. Thin to 12 in. Crops in 6 to 8 weeks. Sow indoors in boxes for winter supply. May be dried.

SPECIES CULTIVATED: *A. Cerefolium*, 'Chervil', white, annual, S.E. Europe, W. Asia; *sylvestris*, white, perennial or biennial, Europe, W. Asia. See also the genus *Chaerophyllum*.

Anthurium (Flamingo-plant; Tail-flower)—*Araceae*. Stove, evergreen flowering plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts rough peat, sphagnum moss. Position, pots, well drained, shady. Pot, March. Water freely March to Nov., moderately afterwards. Temp., Sept. to March 60° to 65°, March to Sept. 70° to 80°.

PROPAGATION: By division of roots in March; seeds sown in a mixture of chopped sphagnum moss, charcoal and sand in temp. of 80° in spring.

SPECIES CULTIVATED, Flowering: *A. Andreanum*, scarlet and white, Colombia; *ornatum*, white and purple, Venezuela; *Scherzerianum*, scarlet, Guatemala, and vars. *album*, white, *Rothschildianum*, creamy-white spotted crimson, *Wardii*, scarlet, with extra large bracts. Ornamental-leaved—*A. crystallinum*, green, Peru; *magnificum*, green and white, Colombia; *Veitchii*, green, Colombia; *Warocqueanum*, green and white, Colombia. For varieties, which are numerous, see trade lists.

Anthyllis—*Leguminosae*. Hardy and slightly tender shrubs and perennials.

CULTURE: Soil, ordinary. Position, open or partly shaded border. Plant, Oct.

PROPAGATION: Shrubby kinds by cuttings of young shoots under bell-glass in cold frame in August; herbaceous species by seeds sown ¼ in. deep in warm border in April; division of roots in Oct.

SPECIES CULTIVATED: *A. Barba-Jovis*, 'Jupiter's Beard' or 'Silver Bush', yellow shrub, to 10 ft., requires wall protection, S. Europe; *Hermanniae*, yellow, June, to 2 ft., dwarf shrub, Medit.; *montana*, pink, June, 3 to 6 in., Alps, and var. *rubra*, fine crimson; *Vulneraria*, 'Woundwort', 'Kidney Vetch', yellow, June to Aug., 6 to 12 in., Britain.

Antigonon (Coral Vine)—*Polygonaceae*. Tendril climbing vines for greenhouse or stove. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, borders with shoots trained close to the glass in full sun. Plant, Nov. Water freely while growth is active, little during winter months. Temp., Sept. to March 60° to 65°, March to Sept. 70° to 80°.

PROPAGATION: By seeds, cuttings.

SPECIES CULTIVATED: *A. leptopus*, 'Corallita', 'Confederate Vine', bright pink, summer, to 30 ft., Mexico, and var. *album*, white.

Antirrhinum (Snapdragon)—*Scrophulariaceae*. Hardy perennial plants, some species grown as annuals for summer bedding. Some authors place *A. Asarina* in a separate genus as *Asarina procumbens*, and *A. Orontium* as *Misopates Orontium*.

CULTURE: Soil, ordinary. Position, warm dry borders, rockeries or walls for dwarf species. Plant, April. For massed effects plant Tom Thumb 6 in., Intermediates 1 ft., and tall varieties 1½ ft. apart.

PROPAGATION: By seed in temp. 70° in March or outdoors in April, transplanting seedlings in May; cuttings of young shoots in cold frame in Aug. Most species are best treated as annuals or biennials, fresh crops being raised every year.

SPECIES CULTIVATED: *A. Asarina*, yellow, summer, trailing, S.W. Europe; *glutinosum*, cream and yellow, June, prostrate, Spain; *majus*, 'Common Snapdragon', pink, July, to 3 ft., Medit. Region, naturalised in Britain, many garden forms have been developed; *Orontium*, purple, summer, to 1 ft., annual, Europe, Asia.

Aotus—*Leguminosae*. Greenhouse, evergreen flowering shrub.

CULTURE: Compost, equal parts loam, peat, sand, charcoal. Pot in March. Position, pots, well drained, in light and sunny greenhouse. Water moderately in winter, freely summer. Prune shoots back after flowering. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 60°.

PROPAGATION: By cuttings of firm shoots in pots of sandy soil under bell-glass, temp. 55°.

SPECIES CULTIVATED: *A. gracillima*, yellow and crimson, May, 3 ft., W. Australia.

Apache Beads, see *Anemopsis*.

Aphelandra—*Acanthaceae*. Stove, evergreen flowering shrubs. Flowers are surrounded by lovely coloured bracts. First introduced early eighteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, pots, moist atmosphere. Water freely in summer, moderately in winter. Prune shoots to within 1 in. of base in Feb. and repot in March. Temp., Sept. to March 60° to 65°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil in bottom-heat (80°), March or April.

SPECIES CULTIVATED: *A. aurantiaca*, orange, winter, 3 ft., Mexico; *pectinata*, scarlet, winter, 3 ft., S. America; *squarrosa* (syn. *A. Leopoldii*), yellow, Brazil, and var. *Louisae*; *tetragona*, scarlet, Aug. to Nov., 3 ft., W. Indies.

Aphelexis, see *Helichrysum*.

Aphyllanthes—*Liliaceae*. Hardy fibrous-rooted perennial.

CULTURE: Soil, light sandy. Position, full sun, dry.

PROPAGATION: By division of old plants; seed when obtainable.

SPECIES CULTIVATED: *A. monspeliensis*, blue, June, 9 in., S. Europe.

Apicra, see *Astroloba* and *Poellnitzia*.

Apios—*Leguminosae*. Hardy, tuberous-rooted climbing perennial. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, warm border against south wall or trellis. Plant tubers in March.

PROPAGATION: By division of tubers in March; seeds.

SPECIES CULTIVATED: *A. americana* (syn. *A. tuberosa*), brown and pink, Aug., 6 to 10 ft., N. America.

Apium—Umbelliferae. Hardy plants, one species grown for blanched leaf stalks as a vegetable and a variety for its edible roots. Some aquatic species chiefly used in aquariums.

CULTURE OF CELERY: Soil, ordinary, richly manured. Prepare trenches in moist site where possible, running north and south, 4 ft. apart, 15 in. wide, and 1 ft. deep for single rows, or 18 in. wide for double rows. Sow seeds in light soil, covering very thinly, in temp. 65° to 75° in Feb. for early crop; in March in similar temp. for main crop, or in cold frame in April. Seedlings in first two cases to be transplanted 2 in. apart in light soil in boxes, kept in temp. 55° to 65° for few weeks, then planted 6 in. apart in shady bed outdoors till required for planting in trenches. Plant beginning of June for early crop; end of June or July for main crop. Distance apart for plants, 8 in. for single row, and 6 in. between rows for double rows. Water and feed liberally until earthed up to ensure crisp, solid hearts. Earth up gradually from Sept. to Nov. in fine weather only, keeping soil out of heart and earthing finally right up to leaves. Lift as required. Protect with bracken during late winter.

CULTURE OF TURNIP-ROOTED CELERY OR CELERIAC: Soil, rich, light. Position, sunny level border. Plant in June, 1 ft. apart in rows, 18 in. asunder. Keep all side shoots removed. Draw little soil around base of each in Aug. Water freely in dry weather. Lift roots in Oct. and store in sand till required for use. Sow and treat seedlings as advised for ordinary celery.

CULTURE OF AQUATIC SPECIES: Soil, aquarium compost or loam. Position, submerged or shallow water at edge of pond or aquarium. Plant, spring or summer.

PROPAGATE: By division or cuttings.

SPECIES CULTIVATED: *A. graveolens* var. *dulce*, 'Celery', var. *rapaceum*, 'Celeriac', edible root-crown; *inundatum*, dissected foliage, white flowers, aquatic; *nodi-florum*, watercress-like leaves, white flowers, aquatic.

Aponogeton—Aponogetonaceae. Hardy and tender aquatics, annuals and perennials. Submerged or with floating leaves, and forked or single spiked flowers floating or standing above water. Introduced late eighteenth century.

CULTURE: Soil, heavy loam enriched with bonemeal. Position, pond or lakes from 6 in. to 2 ft. of water, or tubs in greenhouses for tender species. Some, including *A. ulvaceum*, are used for tropical aquariums. Plant, base of pond or in pans, sinking latter into the water, March to June. *A. leptostachyus abyssinicus* should be grown in very shallow water in pan indoors.

PROPAGATION: Offsets, division or seed sown, directly after gathering, in sifted loam and charcoal in shallow pans.

SPECIES CULTIVATED: *A. crispus*, aquarium plant with white flowers, Ceylon; *distachyus*, 'Cape Pondweed', 'Water Hawthorn', white, forked, fragrant flowers all summer, floating strap-like leaves, hardy, Africa, Australia; *fenestralis*, 'Madagascar Lace Plant', leaves skeletonized to a lattice pattern, submerged, very beautiful, twin spikes, white flowers, tender and difficult to grow, Madagascar; *Krauseanus*, sulphur twin-spikes above water, hardy in south, S. Africa; *leptostachyus* var. *abyssinicus*, forked spikes, mauve, annual, Abyssinia; *spathaceus* var. *juncum*, narrow rush-like foliage, 2 to 4 in., flowers white, blue anthers, shallow water, Africa; *ulvaceus*, submerged, foliage like hart's-tongue fern, flowers sulphur, Madagascar.

Aporocactus—Cactaceae. Greenhouse plants with fleshy creeping stems bearing bristles. Formerly included in the genus *Cereus*. First introduced late seventeenth century.

CULTURE: Compost, two parts turfy loam, one part coarse sand and broken brick. Position, well-drained pots or pans in sunny greenhouse or window. Pot as required, water sparingly. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 60°.

PROPAGATION: By seeds sown in well-drained pots or pans; cuttings of stems in sand.

SPECIES CULTIVATED: *A. flagelliformis*, red or pink, Peru; *Mallisonii*, red, summer, hybrid; *Martianus*, rosy red, Cent. America.

Apple, see *Malus*; **-of Peru**, see *Nicandra Physalodes*; **Crab-**, see *Malus floribunda*.

Aptenia—*Aizoaceae*. Greenhouse succulent plants. Formerly included in *Mesembryanthemum*.

CULTURE: As *Mesembryanthemum*.

PROPAGATION: As *Mesembryanthemum*.

SPECIES CULTIVATED: *A. cordifolia* (syn. *Mesembryanthemum cordifolium*), purple, summer, 1 to 2 ft., S. Africa, and var. *variegata*, variegated leaves.

Aquilegia (Columbine)—*Ranunculaceae*. Hardy perennial plants with spurred (rarely spurless) flowers and ternately-compound leaves. Graceful plants for border or rock garden.

CULTURE: Soil, sandy loam enriched with leaf-mould. Position, well-drained, partly shaded borders and rock gardens. *A. Jonesii* and *A. scopulorum* are suitable for alpine house. Plant, Oct. or March.

PROPAGATION: By seeds in sandy soil in cold frame in Aug., or in open border in April; division of roots in Oct. or April.

SPECIES CULTIVATED: *A. akitensis*, purple and cream, summer, 9 in., Japan; *alpina*, powder-blue, May to June, 12 in., Europe; *atrata*, dark blackish violet, summer, 1½ to 2½ ft., Europe; *Bertolonii*, deep blue, early summer, 6 in., Europe; *caerulea*, 'State Flower of Colorado', blue, summer, 12 in., America; *canadensis*, red and yellow, April to June, 1 to 2 ft., N. America, var. *nana*, 6 to 9 in.; *chrysantha*, soft yellow, 2 ft., summer, America; *discolor*, blue and white, 3 in., Spain; *ecalcarata* (syn. *Semiaquilegia ecalcarata*), purplish maroon, summer, 9 to 18 in., W. China; *flabellata*, pale purple or white, summer, 1 to 1½ ft., Japan, var. *nana-alba*, 6 to 9 in.; *formosa* (syn. *A. arctica*), red and yellow, summer, 3 ft., N. America; *glandulosa*, blue and white, April to June, 8 to 12 in., Siberia, and var. *jucunda*, somewhat double; *grata*, mauve-violet, 6 to 18 in., summer, Yugoslavia; *Jonesii*, blue and white, spring, 3 in., America; *longissima*, long-spurred yellow, May to June, 2 ft., America; *oxysepala*, reddish-violet and yellow, summer, 1½ to 3 ft., E. Asia; *pyrenaica*, blue, May to June, 9 in., Europe; *scopulorum*, blue, early summer, 4 to 6 in., America; *Skinneri*, yellowish green, summer, 2 to 3 ft., Mexico; *sibirica*, lilac and white, June to July, 9 in., Siberia; *Stuartii*, blue and white, June, 9 in., hybrid; *viridiflora*, chocolate and green, early summer, 9 to 12 in., Siberia; *vulgaris*, 'Common Columbine', various, single and double, summer, 1½ to 2½ ft., Europe, incl. Britain. The popular garden aquilegias are hybrids of various species.

Arabian Jasmine, see *Jasminum Sambac*.

Arabis (Wall Cress, Rock Cress)—*Cruciferae*. Hardy annual and perennial alpine trailing plants.

CULTURE: Soil, ordinary. Position, edgings to well-drained borders or massed on sunny rock garden, carpeting beds of spring-flowering bulbs, etc. Alpine house for *A. androsacea*, *A. bryoides olympica*. Plant, Oct. and Nov.

PROPAGATION: Seeds sown in April; cuttings inserted in shady borders in Aug.; division of roots in Oct.

SPECIES CULTIVATED: *A. androsacea*, rare, white, May to June, 1 in., Taurus; *Arendsii* (syns. *A. albida rosea*, *A. 'Rosabella'*), rose, 6 in., spring, hybrid; *aubrietoides*, rose, summer, 6 in., Asia Minor; *blepharophylla*, bright red, early spring, 4 in., America; *bryoides olympica*, rare, silver tufts and white flowers, spring, 1 in., Greece; *Ferdinandi-Coburgii*, white, early summer, 2 to 3 in., Macedonia; *procurrens*, white, spring, 4 in., Europe.

Arachis—*Leguminosae*. Stove flowering annual. After flowering, the seed pod is gradually forced into the soil to ripen its seeds, which are edible.

CULTURE: Compost, loam, leaf-mould and sand. Sow seeds in temp. of 75° to 85° in spring; plant seedlings in small pots and grow in a light position. Water moderately. Temp. 75° to 85°.

SPECIES CULTIVATED: *A. hypogaea*, 'Peanut', 'Monkey-nut', 'Earth-nut', 'Ground-nut', yellow, May, 1 ft., Tropics.

Arachnanthe, see *Arachnis*.

Arachnis—*Orchidaceae*. An epiphytal genus with Vanda-like habit. Flowers distinguished by the curved sickle-like shape of the petals, the lip small, fleshy, on lateral spikes. Sometimes this genus is known as *Arachnanthe*.

CULTURE: Compost, temperature, etc., should be as for *Aerides*. The often leathery leaves denote that fewer waterings are necessary in winter, but the compost should never be dried out, and rather more exposure to light in autumn benefits.

PROPAGATION: As for *Aerides* but can seldom be effected.

SPECIES CULTIVATED: *A. annamensis*, remarkable, rare, up to 18 in., high, flowers 3 to 8 large, 5 or 6 in. vertically, yellow, heavily blotched with deep red-brown, summer, Annam; *Cathcartii*, yellowish with thin bands of red, lip white, yellow and red, summer and autumn, 2 to 4 ft., Himalaya; *Clarkei* (syn. *Esmeralda Clarkei*), yellow-striped brown, lip yellow-spotted brown, autumn, Himalaya; *Lowii* (syns. *Vanda Lowii*, *Dimorphorchis Lowii*), orange-yellow spotted red, late summer, to 6 ft., Borneo; 'Scorpion Orchid', *moschifera* (syns. *Arachnanthe moschifera*, *Renanthera moschifera*), yellowish, blotched with red or red-brown, musk scented, stem 12 ft. long, summer, autumn, Malaya, Java, Borneo. See *Acanthopanax*.

Aralia—*Araliaceae*. Hardy herbs, shrubs or trees. First introduced mid-seventeenth century.

CULTURE: Soil, rich well-drained loam. Position, shady borders for herbaceous species, margins of lakes or ponds or moist sheltered shrubberies for shrubby species. Plant, Sept. to Oct. or March to April.

PROPAGATION: By division in Oct. or March for herbaceous species; seed, suckers or root cuttings for shrubby kinds.

SPECIES CULTIVATED: *A. cachemirica*, white, summer, 6 ft., herbaceous, Himalaya; *chinensis*, 'Chinese Angelica Tree', to 20 ft., somewhat spiny, China; *cordata* (syn. *A. edulis*), white, summer, 4 to 6 ft., young blanched shoots edible, herbaceous, Japan; *elata*, 'Japanese Angelica Tree', to 35 ft., Manchuria; *nudicaulis*, 'Wild Sarsaparilla', greenish, June, 3 to 4 ft., herbaceous, N. America; *racemosa*, 'American Spikenard', greenish white, June, herbaceous, N. America; *spinosa*, 'Devil's Walking stick', 'Hercules' Club', to 30 ft., very spiny, N. America.

Araucaria—*Araucariaceae*. Hardy and slightly tender evergreen coniferous trees. First introduced late eighteenth century.

OUTDOOR CULTURE: Soil, deep rich loam. Position, high, dry and sheltered, away from smoky districts. Should be grown as a well-isolated specimen. Plant, Sept. to Nov.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part leaf-mould, and one part silver sand. Position, pots or tubs well drained in sunny house. Repot in March. Water freely during spring and summer, moderately at other seasons. Avoid overcrowding; give plenty of room. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°. Requires plenty of air in summer.

PROPAGATION: Greenhouse species by means of cuttings of ends of young shoots inserted in sandy loam in a warm greenhouse in autumn; tall, overgrown plants by stem-rooting in spring. Hardy species by seeds sown 1 in. deep in light soil. Temp., Feb., March, April 65°.

GREENHOUSE SPECIES CULTIVATED: *A. Bidwillii*, 'Bunya-Bunya Tree', 100 to 150 ft., Queensland; *columnaris* (syn. *A. Cookii*), 150 to 200 ft., New Caledonia; *Cunninghamii*, 'Moreton Bay Pine', 70 to 100 ft., Queensland; *excelsa*, 'Norfolk Island Pine', 100 to 120 ft., Norfolk Island, and vars. *glauca* and *robusta*; *Rulei* 50 ft., New Caledonia.

HARDY SPECIES CULTIVATED: *A. araucana*, 'Monkey Puzzle' (syn. *A. imbricata*), 50 to 100 ft., Chile, var. *aurea*, golden-tinted foliage.

Araujia—*Asclepiadaceae*. Greenhouse, evergreen flowering climber. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat and leaf-mould, with sand added. Position, pots or beds in greenhouse or conservatory, shoots trained up roof or to wire trellis. Pot, Feb. to April. Water freely March to Sept., moderately afterwards. Syringe twice daily March to Aug. Prune into shape during Jan. or Feb. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

PROPAGATION: By cuttings of young shoots in sandy soil in propagating case, temp. 75° to 80°, in spring.

SPECIES CULTIVATED: *A. sericofera* (syn. *Physianthus albens*), white, August, S Brazil.

Arbor-Vitae, see *Thuja*.

Arbutus—*Ericaceae*. Hardy ornamental foliage and fruit-bearing evergreen trees. Fruit, globular, scarlet, strawberry-like; ripe in Oct., year after flowering.

CULTURE: Soil, sandy peat. Position, sunny, sheltered. Plant, Sept. to Nov. or April.

PROPAGATION: By seeds sown 1 in. deep in well-drained pans of sandy peat in cold frame in March; or grafting on seedling stocks of *A. Unedo* in heat during spring.

SPECIES CULTIVATED: *A. Andrachne*, greenish white, April, 12 to 14 ft., Levant; *Menziesii*, 'Madrona', white, Sept., 25 ft., with peeling bark revealing cinnamon stems, N. America; *Unedo*, 'Strawberry Tree', useful and highly ornamental screening, evergreen, bearing white flowers and fruit like small strawberries, autumn and early winter, grows well in chalk, Europe, including Ireland, var. *rubra*, a good deep pink flowered form.

Archangelica, see *Angelica Archangelica*.

Archontophoenix—*Palmae*. Stove palms. First introduced mid-nineteenth century.

CULTURE: Compost, three parts good fibrous loam, one part decayed manure or leaf-mould and a little coarse sand. Position, well-drained pots or tubs in sunny part of heated greenhouse. Pot, Feb. or March. Water moderately Oct. to March, freely March to Oct. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown 1 in. deep in light sandy soil under bell-glass or propagator in temp. 75°, March or April.

SPECIES CULTIVATED: *A. Alexandrae*, 20 to 80 ft., N. Australia; *Cunninghamiana* (syn. *Seaforthia elegans*), 20 to 60 ft., Queensland and New South Wales.

Arctostaphylos (Bearberry)—*Ericaceae*. Hardy, deciduous and evergreen shrubs.

CULTURE: Soil, peat, leaf-mould and loam. Position, moist, partially-shaded borders or rockeries. Plant in autumn.

PROPAGATION: By cuttings inserted in gritty soil in autumn.

SPECIES CULTIVATED: *A. manzanita*, red stems, grey foliage and pink flowers in April, 8 ft., California; *Uva-ursi*, pink, spring, succeeded by red berries, evergreen, trailing. Both natives of Scotland.

Arctotis—*Compositae*. Half-hardy annuals.

OUTDOOR CULTURE: Soil, loamy, enriched with leaf-mould. Position, preferably sunny, but will do in shade. Plant in April or May. Protect by handlights or frames in winter. Best raised from seed or cuttings annually, and grown outside in summer only.

INDOOR CULTURE: Compost, equal parts of loam and leaf-mould with a little sand. Position, well-drained pots in sunny part of greenhouse. Water liberally from March to Oct., moderately at other seasons.

PROPAGATION: By seeds sown in a temp. of 55° to 65° in March; avoid a too damp atmosphere. Also by cuttings of side shoots inserted in pots of sandy soil in a cold frame in early summer.

SPECIES CULTIVATED: *A. acaulis* (syn. *A. scapigera*), orange-carmine, etc., summer, 6 in., S. Africa; *breviscapa*, orange, summer, 6 in., S. Africa; *laevis*, brownish orange suffused red, 8 in., S. Africa; *stoechadifolia*, white, marguerite-flowers, lavender-blue reverse, summer, 2 ft., Africa and var. *grandis*.

Ardisia (Spear-flower)—*Myrsinaceae*. Stove-flowering and berry-bearing evergreen plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould and sand. Pot, Feb. to April. Position, pots, in light, sunny part of stove. Water freely in summer, little in winter. Prune straggly shoots back closely in March. Temp., March to Sept. 70° to 80°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in above compost in temp. 75° in spring; cuttings of side shoots in similar soil and temp., March.

SPECIES CULTIVATED: *A. crenata* (syn. *A. crispa*), flowers white, borne in June, followed by pretty red berries, 3 to 4 ft., Asia; *esculenta*, purplish-white, 2 to 3 ft., winter, Trop. America; *macrocarpa*, flowers flesh-coloured, followed by large vermilion berries, 5 to 6 ft., Himalaya.

Areca—*Palmae*. Stove palms. Cultivated in India and elsewhere for the nut which is chewed along with the leaf of betel pepper. First introduced late seventeenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould and sand. Position, shady, moist. Water freely at all times. Pot, Feb., March. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 65°.

PROPAGATION: By seeds.

SPECIES CULTIVATED: *A. Cathecu*, 'Betel-nut Palm', 20 to 30 ft., Trop. Asia. See also *Rhopalostylis*.

Arecastrum—*Palmae*. Stove palms, formerly included in *Cocos*.

CULTURE: As *Cocos*.

PROPAGATION: As *Cocos*.

SPECIES CULTIVATED: *A. Romanzoffianum* (syn. *Cocos Romanzoffiana*, *C. plumosa*), 'Queen Palm', 30 ft., Brazil, var. *australe* (syn. *Cocos australis* of botanists).

Aregelia—*Bromeliaceae*. Stove, evergreen flowering and ornamental plants. Leaves in stiff rosettes, inner ones usually being brightly coloured.

CULTURE: Compost, equal parts fibrous loam, rough peat, leaf-mould and silver sand. Position, well-drained pots in light, moist part of stove. Pot, Feb. or March. Water moderately in winter, freely at other times. Temp., March to Sept. 70° to 80°, Sept. to March 65° to 70°.

PROPAGATION: By large-sized offshoots inserted singly in small pots of sandy peat in temp. 85°, Feb. to April.

SPECIES CULTIVATED: *A. princeps* (syn. *Karatas Meyendorffii*), violet, 1 to 1½ ft., S. Brazil; *spectabilis*, blood-red, white and pale blue, 1 ft., Brazil; *tristis*, purple, April, 1 ft., Brazil. Some of these are occasionally wrongly listed as *Nidularium*.

Arenaria (Sandwort)—*Caryophyllaceae*. Hardy herbaceous perennials and rock garden plants. Introduced early eighteenth century.

CULTURE: Soil, ordinary, well drained. Position, rock garden or wall. Plant, Oct. to March.

PROPAGATION: By seeds sown in sandy soil in cold frame in spring. Cuttings in spring or summer, division of roots in Oct. or March.

SPECIES CULTIVATED: *A. balearica*, white, $\frac{1}{4}$ in., June, Balearic Isles; *laricifolia* (syn. *Alsine laricifolia*), white, June, 3 in., Europe; *Ledebouriana*, white, ash-grey leaves, summer, Levantine Alps; *montana grandiflora*, white, April to May, 6 in., Spain; *parnassica*, white, prostrate, spring, Greece; *purpurascens*, soft purple, summer, 2 in., Pyrenees; *Saxifraga*, glossy leaves, white, spring, 2 in., Medit.;

tetraquetra, white, Aug., 3 to 4 in., Spain; *verna* (syn. *Alsine verna*), white, June, 2 in., Britain.

Arethusa—*Orchidaceae*. Low terrestrial orchids, native in E. North American bogs.

CULTURE: Compost, fibrous peat and loam in equal parts with a third of chopped sphagnum, sand and leaf-mould. Nearly hardy in favoured positions but a protection of leaves is required in winter. Position, rather damp.

SPECIES CULTIVATED: *A. bulbosa*, 6 to 9 in. stems bearing a single narrow leaf, terminated by a comparatively large rose-purple flower, blade of lip dilated, recurved, with a yellow beard-like crest, Carolina.

Argemone—*Papaveraceae*. Hardy annuals and perennials; usually grown as annuals. First introduced late sixteenth century.

CULTURE: Soil, sandy. Position, sunny borders, well drained. Plant in March.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in sandy soil outdoors in April, or in heat in March, planting outdoors in May.

SPECIES CULTIVATED: *A. grandiflora*, white, summer, 2 to 3 ft., Mexico; *mexicana*, 'Mexican Poppy', 'Prickly Poppy', yellow, June, 2 ft., annual, Mexico; *platyceras*, white or purple, summer, 1 to 4 ft., N. and S. America.

Ariocarpus (*Anhalonium*)—*Cactaceae*. Greenhouse succulent-stemmed perennials. Grown for the beauty of globose stems. Allied to *Mammillaria*.

CULTURE: Compost, equal parts sandy loam, rough old mortar and pounded bricks. Position, sunny, airy greenhouse or window. Pot, March or April, in well-drained pots just large enough to accommodate roots. Repot every third or fourth year only. Water moderately March to Sept., once a fortnight Sept. to Dec., none afterwards. Syringe on evenings of warm days, June to Sept. Apply soot water to healthy plants, June to Sept. Ventilate freely in summer. Temp., March to Sept. 60° to 70°, Sept. to March 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pans or pots of sandy soil in temp. 75° in March, keeping soil moderately moist; by cuttings of the tops of the plants inserted in small pots of sandy, gritty compost in spring.

SPECIES CULTIVATED: *A. retusus* (syn. *A. prismaticus*), 6 in., Mexico; *scapharostrus*, stem to nearly 4 in. thick, Mexico.

Arisaema—*Araceae*. Stove, greenhouse and hardy tuberous-rooted perennials. Flowers, arum-like in shape. First introduced mid-eighteenth century.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, equal parts peat, leaf-mould, loam and sand. Position, pots in stove or greenhouse. Pot, March. Water freely March to Oct., keep dry afterwards. Temp., March to Oct. 70° to 80°, Oct. to March 60° to 65°, for stove species; Oct. to March 40° to 50°, March to Oct. 55° to 60°, for greenhouse species.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, sunny borders. Plant, Oct. or March. Top-dress with decayed manure after new growth begins. Apply liquid manure occasionally in summer.

PROPAGATION: By seeds or division of the tuberous roots—usually the latter is employed.

STOVE SPECIES CULTIVATED: *A. concinnum*, white, June, 1 to 2 ft., Himalaya; *galeata*, white, July, 1 ft., Himalaya; *tortuosum*, white, April, 4 ft., Himalaya.

GREENHOUSE SPECIES CULTIVATED: *A. speciosum*, white, March, 1 to 2 ft., Himalaya; *triphyllum* (syn. *A. atrorubens*), green and purple, June, 1 to 2 ft., N. America.

HARDY SPECIES CULTIVATED: *A. candidissimum*, white, sometimes pale pink. July, 1½ ft., W. China; *Griffithii*, brown, violet and green, May, 12 to 18 in., Himalaya; *ringens*, white and green, April, 2 ft., Japan.

Arisarum—*Araceae*. Hardy tuberous-rooted perennials.

CULTURE: Soil, cool, light, enriched with leaf-mould. Position, semi-shade or north aspect.

PROPAGATION: By division of roots in spring.

SPECIES CULTIVATED: *A. proboscideum*, 'Mouse-tail Plant', flowers resemble long-tailed brown mice half-hidden in round green leaves, early summer, 6 in., Italy. *vulgare*, purplish-brown, May, 6 in., Mediterranean Region.

Aristea—*Iridaceae*. Greenhouse herbaceous perennials. First introduced early nineteenth century.

CULTURE: Compost, two parts good peat, one part sandy loam and little sand. Position, well-drained pots in light, airy greenhouse. Pot, Feb. or March. Water copiously, April to Oct., moderately afterwards. Temp., Oct. to March 40° to 50°, March to Oct. 50° to 60°. An abundance of air required in summer, moderate amount other times.

PROPAGATION: By seeds sown in sandy loam and peat in temp. 55° to 65° in spring; by offsets removed from parent plant March or April.

SPECIES CULTIVATED: *A. corymbosa* (syn. *Witsenia corymbosa*), purple, summer, 3 ft., S. Africa.

Aristolochia (Birthwort)—*Aristolochiaceae*. Stove and hardy climbing or herbaceous plants. First introduced early eighteenth century.

CULTURE OF STOVE SPECIES: Compost, two-thirds fibrous loam, one-third leaf-mould and sharp sand. Position, pots or borders; shoots trained close to roof of stove. Pot in March. Water freely in summer, little in winter. Temp., March to Sept. 70° to 80°, Sept. to March 60° to 65°. Prune straggly shoots only.

CULTURE OF HARDY SPECIES: Soil, good ordinary, well drained. Position, sunny borders for herbaceous species; south, west or east walls, or pergolas, trellises, etc., for climbing kinds. Plant in autumn or spring.

PROPAGATION: Hardy species by cuttings of ripe shoots inserted in sandy soil in slight heat in summer, or division in spring. Stove and greenhouse species by seeds sown in light, rich soil in temp. 75° in March; cuttings in similar soil and temp., Feb. or March.

STOVE SPECIES CULTIVATED: *A. brasiliensis*, purple, July, 15 to 20 ft., Brazil; *elegans*, green, white and red, 8 to 10 ft., Brazil; *Goldiana*, green and yellow, July, 10 ft., Old Calabar; *grandiflora* (syn. *A. gigas*), 'Pelican Flower', purple-spotted, June to July, 8 to 10 ft., W. Indies, Cent. and S. America, and var. *Sturtevantii* which is better than the type species; *Ruiziana* (syn. *A. Duchartrei*), yellow and brown, July, 2 to 5 ft., Upper Amazons.

HARDY HERBACEOUS SPECIES: *A. Clematitis*, yellow, June to Sept., 2 to 3 ft., Europe.

HARDY CLIMBING SPECIES: *A. durior* (syn. *A. Siphon*), 'Dutchman's Pipe', yellowish brown, May and June, 15 to 30 ft., N. America; *manshuriensis*, tinged brown, hardy, Korea; *tomentosa*, purple, July and Aug., downy foliage, 10 to 15 ft., N. America.

Armeria (Thrift; Sea-pink)—*Plumbaginaceae*. Dwarf perennials with narrow leaves in tufts or basal rosettes.

CULTURE: Soil, sandy loam. Position, edging to sunny borders or massed on rock garden. Plant, Oct. to March.

PROPAGATION: Seeds sown in sandy soil in spring, or division of roots in early autumn or spring.

SPECIES CULTIVATED: *A. juniperifolia* (syn. *A. caespitosa*), intense tufts of many rosettes, white to pink, June, Spain and Portugal, and var. *splendens*; *maritima*, 'Lady's Pincushion', 'Cushion Pink', pink, May to June, 6 in., Britain, vars. *alba*, *Lauchiana* and *alpina*; *mauritanica*, glowing carmine, 2 to 3 ft., June to July, Spain and Portugal; *pseudo-armeria* (syn. *A. cephalotes*), white to dark rose-pink, June, 2 ft., Portugal; *splendens*, pink, 4 to 6 in., May, Spain; *Welwitschii*, pink, 3 in., May to June, Spain.

Armoracia—*Cruciferae*. Perennial herbs with dock-like leaves and edible roots.

CULTURE: Soil, ordinary deep. Plant 18 in. apart in late winter. Harvest following autumn, store in sand or ashes and replant each year for best roots.

PROPAGATION: By cuttings of pencil-thick side roots 5 in. long inserted 4 in. below surface in winter.

SPECIES CULTIVATED: *A. rusticana* (syns. *A. lapathifolia*, *Cochlearia Armoracia*), 'Horse Radish', Britain, Europe.

Arnebia—*Boraginaceae*. Hardy annuals and perennials.

CULTURE: Soil, ordinary. Position, sunny rockery, well drained. Sow seeds of annuals in light soil in frames or cool houses in March, and plant out seedlings in May. Plant perennial species in Oct. or March.

PROPAGATION: Perennial species by seeds or division in spring.

SPECIES CULTIVATED: *A. cornuta*, yellow, spotted with purple, summer, 1½ to 2 ft., Turkistan, annual; *echioides* (syn. *Aiphanthus echioides*), 'Prophet Flower', yellow and purple, summer, to 1 ft., Armenia, perennial.

Arnica—*Compositae*. Hardy herbaceous perennials. Tincture of *A. montana* has medicinal uses.

CULTURE: Soil, ordinary. Position, sunny border. Plant autumn or spring.

PROPAGATION: By division of roots in spring.

SPECIES CULTIVATED: *A. alpina*, bright orange-yellow, 12 in., June, N. America; *Chamissonis*, yellow, July to Sept., 2 ft., N. America; *montana*, 'Mountain Tobacco', yellow, May to July, 1 ft., Europe; *sachalinensis*, yellow, July to Sept., 1½ ft., Sakhalin Is.

Aronia (Chokeberry)—*Rosaceae*. Deciduous shrubs with coloured autumn foliage and fruits. Formerly included in *Pyrus*.

CULTURE: Soil, ordinary, well drained. Position, sunny borders, thrive in chalky soil. Plant Nov. to Feb.

PROPAGATION: By seeds sown when ripe or stratified; suckers; layers; cuttings of green wood under glass.

SPECIES CULTIVATED: *A. arbutifolia*, 'Red Chokeberry', white or pale pink, May to June, pear-shaped red fruits, 5 to 10 ft., Eastern N. America; *melanocarpa*, 'Black Chokeberry', white, May, black fruits, 1½ to 5 ft., spreading by suckers, Eastern N. America; *prunifolia* (syn. *A. floribunda*), 'Purple Chokeberry', white, May, purplish black fruits to 12 ft., Eastern N. America.

Arpophyllum—*Orchidaceae*. Warm, greenhouse, evergreen epiphytic orchids. First introduced early nineteenth century.

CULTURE: Compost as for Cattleyas, with which they succeed, but are the better for lighter shading. More exposure to light in autumn and a more decided rest. Pot, Feb. or March. Position, well-drained pots in sunny part of house. Temp., Oct. to Feb. 50°, other times 60° to 80°. Water very seldom in winter, freely in summer; resting period, winter. Flowers appear at apex of new pseudobulb, small but numerous in cylindrical spikes. All species have the pseudobulbs compressed and bear a single hard fleshy leaf.

PROPAGATION: By division of fairly large plants when repotting.

SPECIES CULTIVATED: *A. cardinale*, rose, summer, 2 ft., Colombia; *giganteum*, purplish-rose, April, 2 ft. or more, Mexico; *spicatum*, purple, April, 12 to 18 in., Mexico and Guatemala.

Arrow Arum, see *Peltandra virginica*; **-head**, see *Sagittaria*; **-root**, see *Maranta arundinacea*; **-Wood**, see *Viburnum dentatum*.

Artemisia—*Compositae*. Hardy shrubs and herbaceous perennials, with hoary and fragrant foliage. Evergreen and deciduous.

CULTURE OF SHRUBBY AND HERBACEOUS SPECIES: Soil, ordinary. Position, sunny borders or rockeries. Plant, Oct. or March.

CULTURE OF TARRAGON: Soil, light, dryish, ordinary. Position, sunny border. Plant roots 2 to 3 in. deep, 8 in. apart in rows 18 in. asunder, March or April. Replant annually. Cut foliage off in Sept., and dry it for use in winter. Place a few roots in ordinary soil in box or large pot, and put this in warm greenhouse in Oct. to supply young shoots during winter.

PROPAGATION: Tarragon, by cuttings of shoots inserted in ordinary soil in temp. 55° in March or April, or under hand-light outdoors in July; division of the roots in March or April. Shrubby and herbaceous species by cuttings inserted in open ground in summer; division in Oct. or March for herbaceous species; seeds sown outdoors in April for annual and other species.

SHRUBBY SPECIES: *A. Abrotanum*, 'Southernwood', 'Lad's Love', or 'Old Man', yellow, Aug., leaves fragrant, 2 to 4 ft., Europe; *arborescens*, 3 ft., S. Europe; *tridentata*, strongly fragrant, 6 to 8 ft., America.

HARDY PERENNIAL SPECIES CULTIVATED: *A. Absinthium*, 'Wormwood', yellow, Aug., 18 in., Europe; *argentea*, yellow, July, 18 in., Madeira; *cana*, yellow, Aug., 2 to 3 ft., N. America; *Dracunculus*, 'Tarragon', 2 ft., S. Europe; *gnaphalodes*, white, summer, 1 to 2 ft., N. America; *lactiflora*, cream, Aug. to Oct., 5 ft., China; *Ludoviciana*, yellow, summer, 3 ft., N. America; *pedemontana*, silver grey foliage, 4 to 6 in., Europe; *pontica*, grey foliage, 2 ft., Austria; *Stelleriana*, yellow, summer, 1 to 2 ft., N.E. Asia and N. America.

Arthropodium—*Liliaceae*. Greenhouse herbaceous perennials. First introduced early nineteenth century.

CULTURE: Compost, two parts sandy loam, one part peat, and a liberal quantity of silver sand. Position, well-drained pots in sunny part of greenhouse. Pot, March or April. Water freely spring and summer, moderately autumn and winter. Temp., Oct. to March 40° to 45°, March to Oct. 55° to 65°.

PROPAGATION: By seeds sown in a mixture of equal parts sandy loam, peat, leaf-mould and sand, in a temp. of 55° to 65° in spring; also by offsets or suckers removed in spring.

SPECIES CULTIVATED: *A. candidum*, white, May, 9 in., New Zealand; *cirrhatum*, white, May, 3 ft., New Zealand; *neocaledonicum*, white, May, 18 in., New Caledonia; *paniculatum*, white, May, 3 ft., New South Wales.

Artichoke, Globe, see *Cynara Scolymus*; **Jerusalem-**, see *Helianthus tuberosus*; **Chinese-**, see *Stachys affinis*.

Artillery Plant, see *Pilea microphylla*.

Artocarpus—*Moraceae*. Stove evergreen trees with large crimson or green leaves. The fruit of *A. communis* is edible. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Pot, Feb., March. Position, shady and moist. Prune into shape, Feb. Water freely in summer, moderately in winter. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 60°.

PROPAGATION: By stem-rooting firm shoots in Feb., March; suckers at any time.

SPECIES CULTIVATED: *A. communis*, 'Bread Fruit Tree', 50 ft., Malaya; *integra*, 'Jack Fruit', 50 ft., India and Malaya.

Arum—*Araceae*. Hardy or half-hardy tuberous-rooted perennials. Grown more for their curiously formed flowers and showy red, poisonous berries than for their beauty. Many species formerly included here have been transferred to other genera.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, partially shady shrubby borders or grassy spots. Plant, autumn or spring. Protect with a covering of leaves in winter.

CULTURE OF HALF-HARDY SPECIES: Compost, two parts loam, one part decayed manure, and one part sand. Position, well-drained border at base of south wall, or pots in a cool greenhouse. Plant or pot in autumn. Water freely whilst growing in pots; keep dry when foliage dies.

PROPAGATION: By offsets in autumn.

HARDY SPECIES CULTIVATED: *A. italicum*, 'Italian Arum', creamy white, spring, 1 to 1½ ft., S. Europe; *maculatum*, 'Cuckoo-pint', 'Lords and Ladies', yellowish green, spotted purple, 6 in., Britain.

HALF-HARDY SPECIES CULTIVATED: *A. creticum*, spathe yellowish, May, 1 ft., Crete; *palaestinum* (syn. *A. sanctum*), yellow and deep purple, May, 2 ft., Syria.

Arum Lily, see *Zantedeschia aethiopica*.

Aruncus (Goat's Beard)—*Rosaceae*. Hardy perennial, at one time included in *Spiraea*.

CULTURE: Soil, moist, rich. Position, part shade.

PROPAGATION: By seeds.

SPECIES CULTIVATED: *A. sylvestris* (syn. *Spiraea Aruncus*, *S. Humboldtii*), white, summer, 4 to 6 ft., N. Temp. Regions, var. *Kneiffii*, finely dissected foliage.

Arundina—*Orchidaceae*. A terrestrial genus with reed-like leafy stems, much as in *Sobralia*. Inflorescence terminal, simple or paniculate.

CULTURE: Compost, three parts fibrous loam, one part peat and sphagnum moss. Water is needed throughout the year. The pots well-drained. Winter temp. 60°, summer to tropical.

PROPAGATION: By division of the plants.

SPECIES CULTIVATED: *A. chinensis*, bluish and crimson, variable, summer, China; *densa*, fragrant, rose violet to crimson, summer, Malaya, Philippines.

Arundinaria—*Gramineae*. Hardy shrubby grasses.

CULTURE: Soil, good, not too heavy and of reasonable depth. Position, sheltered from cold winds, dry root conditions are disliked.

PROPAGATION: By division.

SPECIES CULTIVATED: *A. anceps*, to 10 ft., Himalaya; *falcata*, to 20 ft., stems yellow-green, Himalaya; *gigantea*, 'Southern Cane', 'Cane Reed', to 25 ft., leaves to 12 in. long, finely toothed, glabrous or pubescent, N. America; *vagans* (syn. *Bambusa pygmaea* hort.), 1 to 1½ ft., runs underground, Japan. See also *Chimonobambusa*, *Pleioblastus*, *Pseudosasa*, *Sasa*, *Semiarundinaria*, and *Sinarundinaria*.

Arundo—*Gramineae*. Very tall, hardy perennial grasses.

CULTURE: Soil, well-drained sandy loam. Position, moist and sheltered in isolated groups on lawns. Plant, April. Protect crowns with covering of leaves in winter.

PROPAGATION: By division of roots in spring.

SPECIES CULTIVATED: *A. Donax*, 'Giant Reed', reddish white, Aug., 12 ft., S. Europe, var. *versicolor*, leaves striped with white, 3 ft.

Asarina, see *Antirrhinum*.

Asclepias (Milkweed)—*Asclepiadaceae*. Hardy herbaceous and stove perennials. First introduced late seventeenth century.

CULTURE: Soil, rich, light peat. Position, sunny and moist borders. Plant, Oct. or April. *A. curassavica* in pots in stove with winter temp. 60° to 65°.

PROPAGATION: By division of roots in Oct. or April; also by seeds sown in temp. 50° to 75° in spring. All the hardy species require protection in severe weather.

SPECIES CULTIVATED: *A. curassavica*, red-purple, July to Sept., 2 to 3 ft., tender, Trop. America; *incarnata*, red, 2 ft., N. America; *purpurascens*, purple, July, 2 to 3 ft., Virginia; *speciosa*, purple-lilac, fragrant, July, 2 to 3 ft., N.W. America; *syriaca* (syn. *A. Cornutii*), purple, fragrant, July, 3 to 5 ft., N. America; *tuberosa*, 'Swallow-wort', orange, July to Sept., 1 to 2 ft., N. America.

Ash, see *Fraxinus*; **-leaf Fern**, see *Marattia fraxinea* and *Aneimia*.

Asimina—*Annonaceae*. A strong, hardy, deciduous shrub of the Custard Apple family with large foliage, seldom fruits in this country.

CULTURE: Soil, ordinary, moist. Position, full sun.

PROPAGATION: By seeds (imported).

SPECIES CULTIVATED: *A. triloba*, 'Papaw', purple, fruits fleshy, edible, to 30 ft., N. America.

Asparagus—*Liliaceae*. Climbing greenhouse foliage plants, shrubs and hardy perennials, including the edible asparagus.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part of equal proportions of leaf-mould, peat and silver sand. Position, pots, tubs, or beds, for climbers, shoots trained up roof or back walls of greenhouse; dwarf kinds in pots or baskets suspended from roof. Pot or plant in March. Water and syringe freely during the summer, moderately at other seasons. Apply weak liquid manure occasionally to established plants. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 60°.

CULTURE OF EDIBLE ASPARAGUS: Soil, deep, rich sandy loam. Position, open and sunny, or in partial shade. Size of beds, 4 ft. wide; alleys, 2 ft. wide. Preparation of soil: In Oct. or Nov., trench two spits deep and break up third spit with fork. Put a thick layer of manure over third spit and work in a liberal quantity of old mortar, decayed vegetable matter, and rotted manure among upper spits. In case of heavy wet soils, put a thick layer of brick rubble under second spit. Raise beds 1 ft. above the general level unless ground very well drained. Plant in April. Spread out roots, plants to be 15 in. apart, and crowns 3 in. below surface. Three-year-old plants best for planting. Cutting: No shoots to be removed first year, moderate quantity second year, freely afterwards. Shoots should not be less than 6 in. long when cut. Cease cutting end of June. General treatment: Apply manure periodically. Keep beds free of weeds. Cut down stems early in Nov. Top-dress with decayed manure in Nov., previously lightly forking up surface. In March, rake off rough particles into alley, and leave smooth and neat. Manures: Decayed horse manure for heavy soils; cow or pig manures for light soils; seaweed mixed with above manures and applied as a top-dressing in Nov. if available; common salt, 1 oz. to a square yard occasionally.

FORCING IN FRAMES: Prepare hotbed of manure in usual way. Cover with 3 in. of light soil. Place roots on this and cover to depth of 5 in. Keep soil moist and frame closed until shoots appear, then admit a little air. Temp. 60° to 75°. Roots of no use after forcing.

PROPAGATION: Greenhouse species by seeds sown in temp. 70° in spring; division of roots, March. Edible asparagus, by seeds sown in groups of three or four in holes 1 in. deep and 15 in. apart on prepared bed, or in drills 1 in. deep and 12 in. apart in ordinary soil—March or April. Thin seedlings raised by the first method to one in each group in May; those by the second method to a foot apart when 3 in. high. Transplant latter into permanent beds when two or three years old. Seedlings ready to cut fourth year after sowing. Seeds take 20 days to germinate. A quarter-pint of seed will sow a row 50 ft. long.

GREENHOUSE SPECIES CULTIVATED: *A. acutifolius*, flowers yellow, berries red, 5 to 6 ft., almost hardy, S. Europe; *asparagoides* (syn. *Myrsiphyllum asparagoides*), 'Smilax' of florists, 6 to 10 ft., branching vine, S. Africa; *plumosus*, 'Asparagus Fern', 4 to 10 ft., S. Africa, and vars. *nanus*, dwarf, and *tenuissimus*, wiry-stemmed, all used in floristry; *scandens*, to 6 ft., S. Africa; *Sprengeri*, climbing to 6 ft., Natal; *verticillatus*, 10 ft., S. Africa.

HARDY SPECIES CULTIVATED: *A. officinalis* var. *altilis*, 'Asparagus', Europe and Asia.

Aspasia—*Orchidaceae*. A small genus of epiphytic orchids. Flowers few or solitary, produced as in *Odontoglossums*, with a resemblance in shape.

CULTURE: Compost and treatment as for *Odontoglossum crispum*, but the minimum winter temperature should be 55°.

PROPAGATION: As for *Odontoglossum*. By division of plants or from healthy back bulbs which may emit a growth if removed from the main plant and potted.

SPECIES CULTIVATED: *A. epidendroides*, with the oval pseudo-bulbs about 10 in., creamy white, brown marked, lip white, lilac or violet centrally, spring, Costa Rica, etc.; *lunata*, greenish-white barred chocolate, lip white with a violet crescent, spring, Brazil; *odorata* (syn. *A. lunata papilionacea*), similar to *lunata* but

base of lip with numerous keels, spring, Costa Rica; *principissa*, lip whitish marked light mauve, spring, Cent. America. Other species are known.

Aspen, see *Populus tremula*.

Asperula—*Rubiaceae*. Hardy herbaceous perennials and annuals.

CULTURE: Soil, light, rich. Position, rockeries or in open borders. Plant, Oct., Nov.

PROPAGATION: Perennial species by division of roots in March; perennials and annuals by seeds sown $\frac{1}{8}$ in. deep in open border in April.

PERENNIAL SPECIES CULTIVATED: *A. cynanchica*, 'Squinancy-wort', white, June, 9 in., Europe (Britain); *Gussonei*, white, June to Sept., 6 in., Italy; *hexaphylla*, white, June to Sept., 1 ft.; *hirta*, white, changing to pink, July to Aug., 3 in., Pyrenees; *lilaciflora caespitosa*, pink, prostrate, May to June, E. Medit. For *A. odorata*, see *Galium odoratum*.

ANNUAL SPECIES CULTIVATED: *A. orientalis*, blue, summer, fragrant, 6 to 10 in., Syria.

Asphodel, see *Asphodelus ramosus*.

Asphodeline—*Liliaceae*. Hardy herbaceous perennials. First introduced late sixteenth century.

CULTURE: Soil, ordinary, rich. Position, open or shady borders. Plant, Oct. or March.

PROPAGATION: By division of roots, Oct. or March.

SPECIES CULTIVATED: *A. imperialis*, pink, July and Aug., 6 to 8 in., Cilicia; *lutea* (syn. *Asphodelus luteus*), 'King's Spear', yellow, July and Aug., 3 to 4 ft., Medit. Region, var. *flore-pleno*, flowers double; *taurica* (syn. *Asphodelus tauricus*), white, July, 1 to 2 ft., Orient.

Asphodelus (Asphodel)—*Liliaceae*. Hardy herbaceous perennials. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, shady or open borders. Plant in autumn or spring.

PROPAGATION: By division of roots, Oct. or April; seeds sown in a cold frame in March.

SPECIES CULTIVATED: *A. acaulis*, pink, May, 2 in., N. Africa; *albus*, white, May, 2 ft., Europe; *ramosus*, 'Silver Rod', white, May, 4 to 5 ft., S. Europe. See Asphodeline.

Aspidistra—*Liliaceae*. Greenhouse or dwelling-room evergreen plants. Leaves large, green or variegated with cream. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Repot in March. Water freely in summer, moderately in winter. Room plants best watered by immersing pot for quarter of an hour in tepid water. Temp., min. 50°.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *A. elatior* (syn. *A. lurida*), 'Parlour Palm', leaves green, 1 to 2 ft., China, var. *variegata*, leaves striped cream.

Aspidium, see *Cyrtomium*, *Dryopteris*, *Polystichum*.

Asplenium (Spleenwort)—*Polypodiaceae*. Stove, greenhouse and hardy ferns. Height varies from 6 in. to 4 ft.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, equal parts peat, loam, leaf-mould and sand. Pot March. Water freely in summer, moderately in winter. Temp. stove species, Sept. to March 60° to 70°, March to Sept. 70° to 80°; greenhouse, Sept. to March 50° to 55°, March to Sept. 55° to 65°.

CULTURE OF HARDY SPECIES: Compost, equal parts peat, loam, leaf-mould, sand and old mortar rubble. Position, old walls, rockeries; moist shady borders for Lady Ferns.

PROPAGATION: Stove and greenhouse species by spores sown in sandy peat at any time. Hardy species by spores when ripe, and division in April.

STOVE SPECIES CULTIVATED: *A. attenuatum*, New South Wales, etc., *Belangeri*,

Java, Borneo; *caudatum*, India, Brazil; *formosum*, Trop. America; *longissimum*, Java, etc.; *Nidus*, 'Bird's-nest Fern', Asia, Polynesia, and varieties; *viviparum*, Mauritius.

GREENHOUSE SPECIES CULTIVATED: *A. bulbiferum*, Australia and New Zealand; *Colensoi*, New Zealand; *dimorphum*, Norfolk Is.; *Hemionitis*, Spain, Canary Is.; *incisum*, Japan; *platyneuron*, N. America, S. Africa.

HARDY SPECIES CULTIVATED: *A. Adiantum nigrum*, 'French Fern', Temp. Zones, inc. Britain; *Ceterach* (syn. *Ceterach cordatum*), 'Scale Fern', Europe (Br.); *germanicum*, Europe (Br.); *marinum*, Europe; *Ruta-muraria*, 'Wall-Rue', Europe; *Trichomanes*, N. America, Europe, Asia; *viride*, N. America, Europe, Asia.

Aster (Starwort, Michaelmas Daisy)—*Compositae*. Hardy herbaceous perennials. See Callistephus for China Aster; Solidaster for *A. hybridus luteus*.

CULTURE: Soil, good ordinary. Position, sunny borders, wild garden for tall species, rockeries for dwarf ones. Plant in Oct. or spring. Lift, divide and replant when overcrowded.

PROPAGATION: By seeds in heat or cold frame in spring; cuttings of young shoots in heat or cold frame in spring or summer; division in autumn or spring.

SPECIES CULTIVATED: *A. acris*, lilac-purple, Aug., 3 ft., S. Europe; *alpinus*, 'Rock Aster', purple, July, 6 in., Europe; *Amellus*, 'Italian Starwort', purple, Aug., 2 ft., Europe, and many varieties in shades of lavender, violet and pink; *andinus*, violet, gold disk, May to June, 3 to 6 in., N. America; *Bellidiastrum* (syn. *Bellidiastrum Michellii*), white, early summer, 6 to 9 in., Europe; *Canbyi*, lilac-blue, July to Aug., 1 ft., N. America; *cordifolius*, mauve, July, 2 ft., N. America, var. *versicolor*, light pink flowers; *diplostephioides*, rich purple, June, 1 ft., Himalaya, var. *Eichtlinii*, pale blue; *dumosus*, mauve, Oct., 18 in., N. America; *ericoides*, 'Heath Aster', white, Oct., 2 to 3 ft., N. America; *Farreri*, violet-blue, June to July, 1 ft., China; *Frikartii*, lavender-blue, Aug. to Oct., 2 to 3 ft., hybrid; *grandiflorus*, violet, Nov., 2 to 3 ft., Virginia; *laevis*, blue, Sept., 2 ft., N. America; *lateriflorus* (syn. *A. diffusus*), white, Oct., 2 ft., N. America, var. *horizontalis*, long wide-spreading branches; *likiangensis*, royal purple, May to June, 3 in., China; *multiflorus*, white, Sept. to Nov., 3 ft., N. America; *novae-angliae*, purple, Sept., 5 to 6 ft., N. America, and numerous varieties; *novi-belgii*, blue, Sept., 4 ft., N. America, and numerous forms; *paniculatus*, pale lilac, Sept. to Oct., 3 ft., N. America; *ptarmicoides*, white, Aug., 18 in., N. America; *punicus*, blue, Sept., 6 ft., N. America; *Shortii*, bluish, Sept., 3 ft., U.S.A.; *sub-caeruleus*, violet-blue, June, 9 in., Himalaya; *Thomsonii*, pale blue, July to Nov., 1 to 2 ft., Himalaya; *Tradescantii*, white, Oct., 4 ft., N. America; *turbinellus*, mauve, Aug., 3 ft., N. America; *versicolor*, pink and white, Sept., 3 ft., N. America; *vimineus*, white, Sept., 3 ft., N. America; *yunnanensis*, lilac-blue, June to July, 9 to 12 in., Yunnan.

Asteranthera—*Gesneriaceae*. Small trailing shrub.

CULTURE: Soil, moisture-laden. Position, forest shade, creeping over mossy tree trunks.

PROPAGATION: By seed.

SPECIES CULTIVATED: *A. ovata*, red, small trailing shrub, S. Chile and Argentina.

Astilbe (False Goatsbeard)—*Saxifragaceae*. Hardy herbaceous perennials. Some species are forced for flowering early in greenhouses and often incorrectly named *Spiraea*.

CULTURE: Soil, loamy. Position, moist shady borders or margins of lakes or ponds. Plant in Oct. or spring. Plenty of water is required in dry weather.

INDOOR CULTURE: Compost, two parts loam, one part well-rotted manure or leaf-mould and one of silver sand. Pot roots in Sept. or Oct. Place pots in cold frame and cover with peat till Dec., when introduce to a temp. of 45° for a week or so, then transfer to temp. 55° to 60°. Water freely when growth begins. Apply weak liquid manure when flower spikes show. After flowering, harden off in cold frame till May and then plant out in garden. Lift, divide and replant

following April and lift and pot in autumn. Retarded roots will flower in a cold house in about six weeks from potting.

PROPAGATION: By division; seeds.

SPECIES CULTIVATED: *A. Arendsii*, white to red, July to Aug., 2½ to 5 ft., hybrid group; *astilboides*, white, June, 2 to 3 ft., Japan; *chinensis*, white, July, 2 ft., China, and var. *pumila*, purple, dwarf; *crispa*, rich colours, dwarf, compact, hybrid; *Davidii*, rose-pink, Aug. to Sept., 4 to 5 ft., China; *japonica*, white, May, 2 ft., Japan; *Lemoinei*, white or rose, July to Aug., 2 to 3 ft., hybrid; *rivularis*, white, July, Himalaya; *simplicifolia*, white, June, 1 ft., Japan; *Thunbergii*, white, May, 1 to 2 ft., Japan.

Astragalus (Milk Vetch)—*Leguminosae*. Hardy perennial or shrubby plants. *A. Tragacantha* is a hardy, dwarf, slow-growing shrub. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, open border for tall, and rockery for dwarf species. Full sun for *A. Tragacantha*. Plant, Oct., March.

PROPAGATION: By seeds sown ¼ in. deep in light soil in cold frame in March; shrubby kinds by cuttings in a cold frame in summer.

SPECIES CULTIVATED: *A. alopecuroides*, yellow, June, 3 to 5 ft., Siberia; *Durhamii*, yellow, summer, 2 to 3 ft., Balkan Peninsula; *hypoglottis* (syn. *A. danicus*), blue, June, trailing, Europe; *monspessulanus*, rosy lilac and white, June, trailing, S. Europe; *Onobrychis*, purple, July, 9 to 12 in., Persia; *Tragacantha*, 'Goat's Thorn', pale purple, May, grey leaves, 1 ft., S. Europe.

Astrantia (Masterwort)—*Umbelliferae*. Hardy herbaceous perennials. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, shady borders or margins of woodland walks. Plant, Oct. or March.

PROPAGATION: By seeds sown in sandy loam in cold frame in April; division of roots in Oct. or March.

SPECIES CULTIVATED: *A. Biebersteinii*, white, May, 2 ft., Caucasus; *carniolica*, white, May, 1 ft., E. Europe; *major*, pink and white, 2 ft., Europe; *maxima* (syn. *A. helleborifolia*), pink, July, 2 ft., Caucasus; *minor*, white, tinted green, June, 6 in., Europe.

Astroloba—*Liliaceae*. Greenhouse, succulent-leaved dwarf plants with small whitish flowers, leafy rosettes, stem-like, elongated leaves with thorny teeth. Formerly known under the name of *Apicra* and closely allied to *Haworthia*. Natives of S. Africa.

CULTURE: As *Haworthia*.

PROPAGATION: As *Haworthia*.

SPECIES CULTIVATED: *A. aspera* (syns. *Apicra aspera*, *Haworthia aspera*), stem rosette erect, leaves in three compressed spiral rows; *deltoidea*, stem-like rosettes 8 to 12 in. long, prostrate; *egregia*, 4 to 6 in. high, branching from base; *foliolosa*, leaves in five twisted rows; *pentagona*, 10 in. high erect; *spiralis*, similar to *A. pentagona*, leaves in closely compressed spiral rows.

Asystasia—*Acanthaceae*. Greenhouse flowering shrub. First introduced mid-nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part fibrous peat or leaf-mould, half-part dried cow manure and silver sand. Position, pots or border in light airy greenhouse. Pot, March or April. Prune after flowering, shortening lateral growth to 2 or 3 in. Disbud side shoots when inflorescences show, otherwise they fail to develop satisfactorily. Water freely March to Sept., moderately Sept. to Nov. Keep nearly dry Nov. to March. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

PROPAGATION: By cuttings inserted singly in 2-in. pots filled with sandy soil, June to Aug. Repot as required until plants occupy 8 or 10 in. receptacles, or plant out in well-drained border in light position in conservatory or greenhouse.

SPECIES CULTIVATED: *A. coromandeliana* (syn. *A. gangetica*), yellow, 18 in., winter, Malaya, Ceylon, India, Arabia, Africa.

Atamasco Lily, see *Zephyranthes Atamasco*.

Atherosperma—*Monimiaceae*. Slightly tender, aromatic evergreen tree, or sometimes a bush. In Australia a kind of herb tea is brewed from parts of the plant.

CULTURE: Soil, loam and peat. Position, sheltered, with plentiful water supply.

PROPAGATION: By cuttings.

SPECIES CULTIVATED: *A. moschatum*, white, Tasmania, Victoria, New South Wales.

Athrotaxis—*Pinaceae* (or *Taxodiaceae*). Tender evergreen shrubs and trees. First introduced mid-nineteenth century.

CULTURE: Soil, good loam. Position, sheltered, only grown outside in Cornwall or Ireland. Plant, Sept. or Oct.

PROPAGATION: By seeds sown in pots in cold frame.

SPECIES CULTIVATED: *A. cupressoides*, 20 to 45 ft., Tasmania; *laxifolia*, 25 to 35 ft., Tasmania; *selaginoides*, 'Tasmanian Cedar', 40 ft., possibly more hardy, Tasmania.

Athyrium—*Polypodiaceae*. Foliage similar to *Asplenium* with which genus this is sometimes united.

CULTURE: As *Asplenium*.

PROPAGATION: As *Asplenium*.

SPECIES CULTIVATED: *A. alpestre*, to 3 ft., Europe, Asia, etc.; *Filix-femina*, 'Lady Fern', to 3 ft., Europe, Asia, N. America, etc.; *Filix-mas*, listed name; *Goeringianum*, Japan; *pyncocarpon* (syn. *Asplenium angustifolium*), 1½ ft., N. America; *thelypteroides* (syn. *Asplenium acrostichoides*), to 3 ft., N. America.

Atriplex (Salt Bush)—*Chenopodiaceae*. Hardy annuals, perennials and shrubs. *A. hortensis* occasionally grown as a substitute for spinach, the varieties used for border decoration. *A. Halimus* is a grey-leaved maritime shrub, sometimes used for hedging with tamarisk.

CULTURE OF ORACH: Soil, ordinary. Sow seeds at intervals of a few weeks from March onwards in drills 1 in. deep and 2 ft. apart. When seedlings are 3 in. high, thin them to 18 in. apart. Gather youngest and most succulent leaves for cooking.

CULTURE OF PERENNIAL AND SHRUBBY SPECIES: Soil, ordinary. Position, near the sea. *A. Halimus* suitable for hedge culture. Plant in autumn. Trim into shape April.

PROPAGATION: By cuttings in Aug.

SPECIES CULTIVATED: *A. hortensis*, 'Orach', green, summer, 3 to 5 ft., Cent. Asia. and vars. *atrosanguinea*, *cupreata*, *rosea*, with red foliage.

EVERGREEN SPECIES CULTIVATED: *A. canescens*, 'Grey Sage Bush', leaves light grey, 5 to 6 ft., N.W. America; *Halimus*, 'Shrubby Goosefoot', silvery-grey leaves, 4 to 5 ft., S. Europe.

Aubergine or Eggplant, see *Solanum Melongena* var. *esculentum*.

Aubrieta (Purple Rock-cress)—*Cruciferae*. Hardy trailing evergreen perennials. Former spelling *Aubretia*. Innumerable garden varieties. First introduced early eighteenth century.

CULTURE: Soil, ordinary, loves lime. Position, sunny border, rock garden or walls. Plant, Oct. and spring. Plants will benefit from a severe trimming after flowering.

PROPAGATION. By cuttings (small) dibbled into pots of sandy soil or beneath cloche in shady borders in June; seeds sown in sandy soil in spring; division of the roots in spring. (Seeds of named garden varieties will not come true to type.)

SPECIES CULTIVATED: *A. deltoidea*, purple, spring, 2 in., S. Europe, Asia Minor; *erubescens*, purple, 3 in., spring, Macedonia; *gracilis*, pale lavender, 2 in., spring, Greece; *Kotschyi*, purple, 3 in., spring, Persia; *libanotica*, pale lavender, 3 in., spring, Syria; *Pinardii*, purple, 2 in., spring, Asia Minor.

Aucuba—*Cornaceae*. Hardy evergreen shrub. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, open or in shade; used as a town shrub, and as a good screen beneath dense trees. Plant, Oct., Nov., April. Female aucubas bear red berries freely in winter if a male plant be placed close to them, or if a branch of male blossom be placed on female plant when in bloom. May be used for pot culture in cool greenhouses or windows in winter.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in cold frame in Oct.; cuttings inserted in sandy soil in sheltered border or cold frame in Sept., Oct., Nov.

SPECIES CULTIVATED: *A. japonica*, 'Spotted Laurel', 'Variegated Laurel', 6 to 10 ft., Japan, and vars. *albo-variegata*, *aurea*, *fructu-luteo*, *limbata*, *vera nana*, *viridis*, etc.

Aunt Eliza, see *Antholyza*.

Auricula, see *Primula Auricula*.

Australian Bluebell Creeper, see *Sollya heterophylla*; **-Currant**, see *Leucopogon Reichei*; **-Daisy**, see *Erigeron Karvinskianus*; **-Everlasting**, see *Helipterum*; **-Feather-palm**, see *Ptychosperma elegans*; **-Fleabane**, see *Erigeron Karvinskianus*; **-Fuchsia**, see *Correa*; **-Giant Lily**, see *Doryanthes excelsa*; **-Heath**, see *Epacris*; **-Honeysuckle**, see *Banksia*; **-Hop**, see *Daviesia alata*; **-Ivy**, see *Muhlenbeckia adpressa*; **-Lilac**, see *Hardenbergia monophylla*; **-Native Rose**, see *Boronia serrulata*; **-Pitcher Plant**, see *Cephalotus follicularis*; **-Rosemary**, see *Westringia*; **-Sarsaparilla Tree**, see *Hardenbergia*; **-Tree Fern**, see *Dicksonia antarctica*.

Austrian Briar, see *Rosa foetida*; **-Dragonshead**, see *Dracocephalum austriacum*; **-Leopard's Bane**, see *Doronicum austriacum*; **-Pine**, see *Pinus nigra*.

Autumn Crocus, see *Colchicum*; **-Flowering Squill**, see *Scilla autumnalis*; **-Sneezewort**, see *Helenium autumnalis*.

Avena (Oat)—*Gramineae*. Hardy, mostly annual, grasses, native in temperate regions of the world and grown for grain, forage and hay. One species (*A. sterilis*) is grown for ornament; the awns are susceptible to change of weather and animated.

CULTURE: Sow seeds outdoors in April in ordinary soil in borders. Can be gathered when fully developed and dried for winter decoration.

SPECIES CULTIVATED: *A. sterilis*, 'Animated Oat', 2 ft., Medit. Region.

Avens, see *Geum*.

Avocado Pear, see *Persea americana*

Azalea, see *Rhododendron*; **Alpine-**, see *Loiseleuria*.

Azara—*Flacourtiaceae*. Half-hardy evergreen shrubs with ornamental leaves. Flowers unattractive but very fragrant. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, against south wall, or in warm shrubberies in mild districts. Plant, Oct. or April.

PROPAGATION: By cuttings inserted in sandy soil in temp. 65° in March; or in close frame in Aug.

SPECIES CULTIVATED: *A. dentata*, yellow, June, 10 to 12 ft., Chile; *Gilliesii*, yellow, May, 12 to 15 ft., Chile; *microphylla*, greenish white, March, strongly vanilla-scented, the hardiest species, to 15 ft., Chile.

Azolla (Fairy Moss)—*Salviniaceae*. Hardy, floating aquatic perennials with delicate fern-like foliage.

CULTURE: Grow in shallow ponds or in indoor aquariums. Require no soil, merely to float on surface of water.

PROPAGATION: By division.

SPECIES CULTIVATED: *A. caroliniana*, pale green, turning red in autumn, lacy, Carolina; *fliculoides*, larger fronds, pale green tinted rose, S. America.

Azorella—*Umbelliferae*. Hardy, evergreen, prostrate, perennial rock plants. Flowers small, yellow and not attractive, except those of *A. trifurcata* which are handsome in a mass.

CULTURE: Soil, gritty. Position, sunny. Plant, spring.

PROPAGATION: By cuttings inserted in sandy soil in spring or summer; division of old plants.

SPECIES CULTIVATED: *A. peduncularis*, yellowish, June, 2 to 3 in., Ecuador; *trifurcata*, yellow, bronze-green rosettes, June, 2 in., Ecuador.

Babiana (Baboon-root)—*Iridaceae*. Half-hardy bulbous plants with fragrant flowers, from S. Africa. First introduced mid-eighteenth century.

OUTDOOR CULTURE: Soil, light sandy. Position, sunny, well-drained border. Plant, Sept. to Jan., placing bulbs 4 in. deep and 2 in. apart. Lift and replant bulbs annually.

INDOOR CULTURE: Compost, two parts sandy soil and one part leaf-mould or decayed cow manure. Pots, 4½ in. in diameter, well drained. Place five bulbs 3 in. deep in each pot in Nov., and cover pots with peat until growth begins. Water moderately from time bulbs begin to grow until flowers fade, then gradually withhold it, keeping bulbs dry from Sept. to Jan. Temp., Sept. to Feb. 40° to 50°, other times 50° to 60°.

PROPAGATION: By offsets.

SPECIES CULTIVATED: *B. disticha*, blue, June, 6 in.; *plicata*, blue, June, 6 in.; *ringens*, scarlet, June, 6 to 8 in.; *stricta*, white and blue, May, 6 to 8 in.

Baby Blue-eyes, see *Nemophila Menziesii*.

Baby's Tears, see *Helxine*.

Baccharis—*Compositae*. Hardy deciduous and evergreen shrubs of little ornamental value. Flowers unisexual. First introduced late seventeenth century.

CULTURE: Soil, ordinary. Position, sea-coast gardens. Plant, autumn.

PROPAGATION: By cuttings of young shoots in summer.

SPECIES CULTIVATED: *B. halimifolia*, 6 to 12 ft., Eastern N. America; *patagonica*, 8 to 10 ft., Magellan Straits.

Bachelor's Buttons, see *Ranunculus aconitifolius*, var. *pleniflorus* and *Achillea Ptarmica*, double forms.

Bactris—*Palmae*. Stove palms. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Pot, Feb., March. Water moderately Sept. to March, freely afterwards. Position, shady and moist in summer. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By removing young plants from the bases of old ones in March, and placing these in small pots; also by seeds.

SPECIES CULTIVATED: *B. caryotaefolia*, 30 ft., Brazil; *Maraja*, 'Maraja Palm', 30 to 50 ft., Brazil; *pallidispina*, Guiana.

Bael Fruit, see *Aegle Marmelos*.

Baeria—*Compositae*. Mostly hardy annuals. *B. macrantha* is semi-shrubby from perennial rootstock.

CULTURE: Soil, light sandy, preferably without lime. Position, full sun. Plant, spring.

PROPAGATION: By seeds; cuttings inserted in sand during summer.

SPECIES CULTIVATED: *B. aristata* (syn. *B. coronaria*), yellow, summer, trailing, California; *chrysostoma* (syn. *B. gracilis*), yellow, May, 8 to 12 in., California; *macrantha*, yellow, all summer, 6 to 9 in., perennial, N. America.

Bahia, see *Eriophyllum*.

Bald Cypress, see *Taxodium distichum*.

Baldmoney see *Meum athamaticum*.

Balloon Flower, see *Platycodon*.

Balm, see *Melissa officinalis*; **-of-Gilead**, see *Cedronella canariensis*; **-of-Gilead Fir**, see *Abies balsamea*; **Bee-**, see *Monarda didyma*.

Balsam, see *Impatiens Balsamina*; **-Apple**, see *Momordica Balsamina*; **-Fir**, see *Abies balsamea*; **-Pear**, see *Momordica Charantia*; **-scented Geranium**, see *Pelargonium Radula*.

Bamboo, see *Arundinaria*, *Bambusa*, *Chimonobambusa*, *Phyllostachys*, *Pleioblastus*, *Pseudosasa*, *Sasa*, *Semiarundinaria*, *Shitataka* and *Sinarundinaria*.

Bambusa (Bamboo)—*Gramineae*. Tall woody grasses.

OUTDOOR CULTURE: Soil, deep rich loam. Position, warm sheltered nook or dell. Plant, May or June. Protect in winter with covering of leaves. Mulch in spring. Water freely in dry weather.

INDOOR CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, large pots or tubs in cool greenhouse, winter temp. 40° to 50°. Water freely spring and summer, moderately other times.

PROPAGATION: By seeds in sandy soil in heat in spring; cuttings of rhizomes in heat in spring; division in April or May.

SPECIES CULTIVATED: *B. angulata* (syns. *B. quadrangularis*, *Arundinaria quadrangularis*), 3 ft., China; *arundinacea*, 10 to 50 ft., tender, India; *vulgaris* (syn. *B. Thoursii*), 'Feathery Bamboo', to 50 ft., glaucous, tender, Java.

Banana, see *Musa*.

Baneberry, see *Actaea*.

Banksia (Australian Honeysuckle)—*Proteaceae*. Greenhouse evergreen shrubs or trees. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Pot in spring in well-drained pots. Water carefully in winter, moderately in summer. Temp., Sept. to March 60° to 65°, March to Sept. 55° to 65°.

PROPAGATION: By cuttings of firm shoots in well-drained pots of sandy soil in July under bell-glass in temp. 55° to 65°; also by seeds sown in sandy soil in temp. 60° to 65°.

SPECIES CULTIVATED: *B. collina*, 6 ft., Australia; *dryandroides*, 6 ft., Australia; *grandis*, 30 to 40 ft., Australia; *integrifolia*, 10 to 12 ft., Australia; *occidentalis*, 5 ft., Australia; *quercifolia*, 5 ft., hardy in favoured situations, otherwise requiring cold greenhouse, Australia; *speciosa*, 6 ft., Australia; *serrata*, to 20 ft., Australia; *verticillata*, 15 to 20 ft., Australia.

Banyan, see *Ficus benghalensis*.

Baptisia (False-indigo)—*Leguminosae*. Hardy herbaceous perennials and shrubs. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, sunny, well-drained border. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in sandy soil in shallow boxes in cold frame in April, or in sunny borders outdoors in May; division in March.

SPECIES CULTIVATED: *B. alba*, white, June, 2 ft., N. America; *australis*, blue, June, 3 to 4 ft., spreading bush, N. America; *leucantha*, cream, July, 2 ft., N. America; *tinctoria*, yellow, July, 2 ft., N. America.

Barbados Cherry, see *Malpighia glabra*; **-Gooseberry**, see *Pereskia*; **-Lily**, see *Hippeastrum equestre*; **-Pride**, see *Poinciana pulcherrima*.

Barbarea (American Cress)—*Cruciferae*. Hardy perennial plants and salad vegetables.

CULTURE OF FLOWERING SPECIES: Soil, ordinary. Position, open garden; edgings to beds or sunny rockeries for variegated kind.

CULTURE OF WINTER CRESS: Soil, ordinary. Position, moist, partially shaded border. Sow seeds in shallow drills 9 in. apart in Sept. for winter use; in March and June for summer use. Gather tops of young leaves for salading.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *B. verna*, 'Winter' or 'Land Cress' (syn. *B. praecox*), Britain; *longirostris*, 'Thracian Cress', pale yellow, May to June, 1 ft., Balkan Peninsula; *vulgaris*, yellow, summer, 1 to 2 ft., var. *variegata*, leaves yellow and green.

Barbary Fig, see *Opuntia vulgaris*.

Barberry, see *Berberis*.

Barborton Daisy, see *Gerbera Jamesonii*.

Barkeria, see *Epidendrum*.

Barleria—*Acanthaceae*. Stove flowering evergreen shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, two parts peat and loam, one part decayed manure and sand. Plant in March in well-drained pots. Temp., Sept. to March 55° to 65°, March to Sept. 70° to 85°. Water moderately in winter, freely in summer. Prune shoots back after flowering. Syringe daily during spring and summer.

PROPAGATION: By cuttings of young shoots inserted in sandy peat under bell-glass in temp. 85°, March to July.

SPECIES CULTIVATED: *B. cristata*, purple, white, July, 2 ft., India, Burma; *flava*, yellow, winter, 18 in., Trop. Africa; *involucrata*, blue, winter, 1 to 2 ft., Ceylon; *lupulina*, yellow, Aug., 2 ft., Mauritius; *strigosa*, blue, July, 2 to 3 ft., India.

Barren Strawberry, see *Waldsteinia fragarioides*; **-wort**, see *Epimedium*.

Bartonia, see *Mentzelia*.

Basil, see *Ocimum Basilicum*.

Basket Grass, see *Oplismenus compositus*.

Basswood, see *Tilia*.

Bastard Balm, see *Melittis Melissophyllum*; **-Cedar**, see *Cedrela sinensis*; **-Indigo**, see *Amorpha fruticosa*.

Bat Willow (*Salix caerulea*).

Batemannia—*Orchidaceae*. Stove, evergreen epiphytic orchids. Pseudo-bulbs 2 to 3 in. high, dimly 4-angled, racemes arched or pendulous, flowers 1 to 5, moderately large. The flowers have the anterior portions of the lateral sepals divergent. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts fibrous peat or osmunda fibre and sphagnum moss. Position, shallow basket or in pans. Repot March. Water freely in summer, in winter prevent the compost becoming dry. Winter temp. 65° to 70°, summer 70° and higher. Keep atmosphere moist, shade.

PROPAGATION: By division of old plants at potting time.

SPECIES CULTIVATED: *B. armillata*, greenish white and brown, early summer, Brazil; *Beaumontii*, greenish, yellowish, striped brown, lip white, dotted purple, summer, Brazil; *Colleyi*, 6 to 8 in., purplish-brown, lip marked red at base, August, British Guiana; *peruviana*, greenish white, and purple, spring, Peru.

Bauhinia—*Leguminosae* (or *Caesalpiniaceae*). Stove evergreen shrubs. First introduced late seventeenth century.

CULTURE: Compost, equal parts peat and loam, one-sixth sand. Pot firmly in March. Position, light, sunny, moist in summer. Water freely March to Sept., moderately other times. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings inserted in well-drained pots of sandy peat under bell-glass in temp. 75° in July.

SPECIES CULTIVATED: *B. Galpinii*, white, July, 6 ft., S. Africa; *natalensis*, white, Sept., Natal; *purpurea*, red and white, 10 to 15 ft., India, Burma, China; *tomen-*

tosa, yellow and red, 10 to 15 ft., Ceylon; *Vahlia*, white, large climber, India; *variegata*, rose, red and yellow, June, 6 to 20 ft., India, China.

Bayonet Plant, see *Aciphylla squarrosa*.

Bay Tree, see *Laurus nobilis*.

Bead Tree, see *Melia*.

Bean, Broad, see *Vicia Faba*; **Butter-**, see *Phaseolus vulgaris*; **Dutch-**, see *P. coccineus* var. *albus*; **French-**, see *P. vulgaris*; **Haricot-**, see *P. vulgaris*; **Kidney-**, see *P. vulgaris*; **-Lily**, see *Nymphoides*; **Scarlet Runner-**, see *P. coccineus*; **-Tree**, see *Ceratonia Siliqua*.

Beard Tongue, see *Penstemon*.

Bearberry, see *Arctostaphylos*.

Bear's Breech, see *Acanthus mollis*; **-Ear**, see *Primula auricula*; **-Ear Sanicle**, see *Cortusa Matthioli*; **-foot Fern**, see *Humata Tyermannii*; **-paw Fern**, see *Polypodium Meyenianum*.

Beaucarnea—*Liliaceae*. Greenhouse tree-like plants with tall trunks somewhat swollen at base, long linear leaves and small whitish flowers in panicles. Sometimes retained in the genus *Nolina*.

CULTURE: Compost, two parts fibrous loam, one part silver sand. Pot, March, in well-drained pots. Water freely March to Sept., moderately other times. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown in sandy loam in temp. 65° in Feb. or March.

SPECIES CULTIVATED: *B. recurvata* (syn. *Nolina tuberculata*), leaves recurved, to 30 ft., Mexico.

Beaufortia—*Myrtaceae*. Greenhouse, evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts leaf-mould, loam and peat, one-sixth sand. Pot and prune, March; make soil quite firm and drain pots well. Water freely May to Aug., moderately at other times. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil in temp. 55° to 65° in summer.

SPECIES CULTIVATED: *B. decussata*, scarlet, May, 3 ft., Australia; *purpurea*, purple, July, 2 to 3 ft., Australia; *sparsa*, red, June, 2 to 3 ft., Australia.

Beaumontia—*Apocynaceae*. Stove climber. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat and loam, one-sixth sand. Position, large tub or border, well drained. Shoots to climb roof. Pot or plant, March. Water abundantly May to Aug., moderately afterwards. Temp., Sept. to March 60° to 70°; March to Sept. 70° to 80°.

PROPAGATION: By cuttings inserted in sandy soil in temp. 75° in March.

SPECIES CULTIVATED: *B. fragrans*, Cochin-China; *grandiflora*, 'Nepal Trumpet Flower', white, July to Aug., 15 to 20 ft., India; *Jerdoniana*, 15 to 20 ft., India.

Beauty Bush, see *Kolkwitzia amabilis*.

Bedstraw, see *Galium*.

Beech, see *Fagus*; **-Fern**, see *Dryopteris Phegopteris*.

Beet, see *Beta*; **Leaf or Spinach-**, see *B. vulgaris* var. *Cicla*; **-root or Sugar-**, see *B. vulgaris*.

Beewort, see *Acorus*.

Begonia—*Begoniaceae*. Warm, greenhouse fibrous and tuberous-rooted perennials. Some are grown for flowers and others for ornamental foliage. First introduced mid-eighteenth century.

CULTURE OF TUBEROUS-ROOTED TYPE: Compost, equal parts loam and leaf-

mould and one part of equal proportions of dried cow manure and silver sand. Start tubers to grow in Feb. or March by placing them in leaf-mould in shallow boxes in temp. 65° to 70°. When rooted, plant in small pots and afterwards transfer to large ones. Water moderately at first, fully afterwards. Feed with diluted liquid manure when growth is active. Shade from sun. After flowering, gradually withhold water and keep dry till Feb. Store in pots on their sides in temp. 50° to 55° in winter. For outdoor culture start tubers in March, and when rooting begins transplant into boxes, grow in heat till May, then plant out early in June in rich soil in partial shade. Lift tubers in Sept., place in boxes to ripen off, then store as advised for pot tubers.

CULTURE OF FIBROUS-ROOTED TYPE: Compost, same as advised for tuberous-rooted species. Sow seeds in Jan. or Feb. in temp. of 65° to 75°, or insert cuttings in pots in a similar temp. in Feb. or March. Grow the seedlings or rooted cuttings on, first in small and then larger pots in temp. 55° to 65°. Water moderately. Syringe daily. Shade from sun. Keep moist during earlier stages of growth. In autumn keep air drier and maintain temp. of 55°. Feed occasionally with liquid manure. After flowering gradually withhold water, and keep rather dry till March, when begin to give water and repot to grow and make larger plants.

CULTURE OF ORNAMENTAL-LEAVED TYPE: Compost, as advised in previous case. Pot in spring. Grow in shady position. Water freely in spring and summer, moderately in winter. Winter temp. 45° to 55°, summer temp. 55° to 65°. Feed with weak liquid manure in summer.

PROPAGATION: Ornamental-leaved type by leaf cuttings in spring or summer. Winter-flowering, by cuttings as described above or by seeds. Fibrous-rooted, by seeds or cuttings. Tuberous-rooted type by seeds sown on surface of fine sandy compost in temp. 65° to 75° in Feb., and grow seedlings on as advised for tubers; also by cuttings of young shoots in the spring.

TUBEROUS-ROOTED SPECIES CULTIVATED: *B. Bertinii*, scarlet, 1 to 2 ft., hybrid; *boliviensis*, scarlet, summer, 2 ft., Bolivia; *Clarkei*, rose, summer, Peru; *Davisii*, red, summer, Peru; *Pearcei*, yellow, summer, 1 ft., Bolivia; *rosaeiflora*, rose, summer, Peru; *Veitchii*, red, summer, Peru. The foregoing were the original parents of the present race of single and double-flowered tuberous-rooted begonias grown in gardens. For names of varieties see trade lists.

FIBROUS-ROOTED SPECIES CULTIVATED: *B. albo-coccinea*, scarlet and white, winter, 18 in., India; *acutifolia*, white, spring, 3 to 4 ft., Jamaica; *angularis*, white, white-veined foliage, 8 ft., Brazil; *carminata*, scarlet, 2 ft., hybrid; *coccinea*, scarlet, April, 3 to 4 ft., Brazil; *Dregei*, white, July, 1 to 3 ft., S. Africa; *Evansiana*, pink, Sept., China; *Froebelii*, scarlet, 1 ft., Ecuador; *fuchsoides*, scarlet, winter, 4 to 6 ft., Mexico; *foliosa*, white and rose, summer, semi-pendulous, Colombia; *glaucophylla*, rose-pink, winter, pendulous or climbing, Brazil; *hydrocotylifolia*, rose-pink, summer, 1 ft., Mexico; *incarnata*, rose, winter, 2 to 3 ft., Mexico; *incana*, white, winter, 1 to 2 ft., Brazil; *Ingramii*, deep pink, 2 ft., hybrid; *keuensis*, white, 3 ft., hybrid; *manicata*, pink, winter, 9 to 12 in., Mexico; *nitida*, pale pink or rose, Sept., 3 to 5 ft., Jamaica; *Scharffiana*, white, winter, 1 to 3 ft., Brazil; *semperflorens*, rose, red or white, winter, 6 to 18 in., Brazil, and vars., of which *gigantea rosea* is very distinct, bearing large, sterile flowers; *socotrana*, rose-pink, Nov., 1 to 1½ ft., Isle of Socotra; *weltoniensis*, Dec., 18 in., hybrid; and numerous other hybrids and varieties such as *Gloire de Lorraine*.

ORNAMENTAL-LEAVED SPECIES CULTIVATED: *B. albo-picta*, greenish-white, foliage glossy green spotted silver, 1 to 1½ ft., Brazil; *Alleryi*, red and white, 3 to 4 ft., hybrid; *argenteo-guttata*, white and pink, foliage speckled with white, 2 to 4 ft., hybrid; *heracleifolia*, white or rose, foliage deeply lobed, 2 to 4 ft., hybrid; *imperialis*, white, foliage deep velvety green and bright green, 6 to 12 in., Mexico; *laciniata* (syn. *B. Bowringiana*), white, foliage purplish-black and green, 1½ to 2 ft., India, China; *maculata*, rose or white, foliage green dotted white, 2 to 4 ft., Brazil, and var. *Wightii*, Brazil; *metallica*, bluish-white, foliage green with metallic lustre, 3 to 4 ft., Brazil; *olbia*, white, foliage bronze-green dotted

white, 1 ft., Brazil; *Rex-cultorum* (*B. Rex* of horticulture), pale rose, foliage metallic green marked silver and purple, 2 ft., Assam; *ricinifolia*, rose-pink, foliage lobed, bronze-green, 2 to 4 ft., hybrid; *sanguinea*, white, foliage rich green above, blood-red beneath, 4 ft., Brazil.

Belamcanda—*Iridaceae*. Perennial with stout rootstocks cultivated for the flowers and also for the ornamental black seeds that remain when capsule splits.

CULTURE: Soil, rich sandy. Position, sunny.

PROPAGATION: By seeds; division.

SPECIES CULTIVATED: *B. chinensis*, orange, spotted red, summer, to 4 ft., China, Japan; *flabellata*, light yellow, spotted orange at base, autumn, Japan.

Belladonna Lily, see *Amaryllis Belladonna*.

Bell Flower, see *Campanula* and *Wahlenbergia*; **-Heather**, see *Erica cinerea*; **-wort**, see *Uvularia*.

Bellis (Daisy)—*Compositae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary. Position, sunny or shady. Plant, Oct. or March.

PROPAGATION: By division of old plant in June, inserting divisions 3 in. apart in shady border; seeds sown $\frac{1}{8}$ in. deep in boxes of light soil in cold frame in March, transplanting seedlings in open border in July.

SPECIES CULTIVATED: *B. perennis flore-pleno*, and its numerous varieties, native of Britain, etc.; *rotundifolia caerulea*, white, tinged blue, June, 3 in., Algeria; *sylvestris*, bright red, yellow disk, June, 4 to 6 in., Medit.

Bellium (False Daisy)—*Compositae*. Hardy annuals and perennials. First introduced mid-eighteenth century.

CULTURE: Soil, sandy loam. Position, rockery or border sheltered from north-east winds. Plant, April.

PROPAGATION: By division of plants in March; annuals by seeds sown as for *Bellis*.

SPECIES CULTIVATED: *B. bellidioides*, white, July, 3 in., Medit. Region, perennial; *minutum*, white, Aug., 3 in., Greece, annual.

Beloperone—*Acanthaceae*. Stove evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts leaf-mould, loam and sand. Pot, March, moderately firmly. Position, sunny greenhouse. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°. Water freely May to Sept., moderately afterwards. Remove points of shoots occasionally in summer to induce dwarf growth.

PROPAGATION: By cuttings inserted singly in small pots of light sandy soil in temp. 75° in Feb., March or April.

SPECIES CULTIVATED: *B. guttata*, 'Shrimp Plant', white spotted, purple, 1½ ft., Mexico; *oblongata*, rosy purple, 3 ft., Aug., Brazil; *violacea*, violet, Aug., 3 ft., Brazil.

Benjamin Bush, see *Lindera Benzoin*.

Benthamia, see *Cornus*.

Benzoin, see *Lindera*.

Berberidopsis—*Flacourtiaceae*. Climbing shrub, hardy in warmest localities only, half-hardy in Midlands and North; evergreen. First introduced mid-nineteenth century.

CULTURE: Soil, sandy loam. Position, against wall of any aspect including those facing north; protect in severe winter with straw or mats. Good wall shrub for cool greenhouse. Plant, Oct. or April. Prune straggly shoots only in April. Requires training.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of sandy soil, in temp. 55° in March; cuttings of young shoots in similar soil and temp.; layering of shoots in the open in Sept., Oct. or Nov.

SPECIES CULTIVATED: *B. corallina*, 'Coral Berry', crimson, summer, 5 to 10 ft., Chile.

Berberis (Barberry)—*Berberidaceae*. An extensive family of beautiful and easily grown shrubs, evergreen and deciduous, the former grown mainly for beauty of flower and the latter for autumn colouring and fruits. Berries of the Common Barberry (*B. vulgaris*) make excellent preserve. Many species make good hedges. Some species formerly included in this genus have been transferred to Mahonia.

CULTURE: Any well-cultivated soil. Position, anywhere except in dense shade, but prefer sunny warm conditions and thrive on dry sandy or chalky formations. Plant deciduous species Oct. or March; evergreens require care, Oct. or April being best. Deciduous species are better for an occasional thinning out of older, darker coloured wood in winter; evergreen species require no pruning.

PROPAGATION: By seed sown 1 in. deep in sheltered border in Nov., resultant plants show considerable variation; cuttings of firm young shoots in sandy soil in cold frame in Sept.; layering shoots in spring.

Specific names are confused especially where stocks are raised from seed for distribution. Over 170 species known to cultivation, mostly highly ornamental, and some of the best are given here.

DECIDUOUS SPECIES CULTIVATED: *B. aggregata*, coral berries, 6 ft., China, and var. *Prattii*; *brevipaniculata*, flowers yellow, berries red, 6 ft., China; *chillanensis*, a newer species with yellow and orange flowers and black fruits, 6 ft., Andes; *Chitria*, young growths tinted copper, brilliant plum-coloured fruits, 12 ft., spreading, Himalaya; *concinna*, very large amber-red berries, 3 ft., Himalaya; *dictyophylla*, young shoots covered white bloom, red fruits, 6 ft., Yunnan; *Jamesiana*, pretty foliage spring to autumn, coral fruits, 8 ft., W. China; *Lycium*, light green foliage, showy purple fruits, 8 ft., spreading, often half-evergreen, Himalaya; *mitifolia*, crimson oblong fruits, 5 ft., China; *montana*, newer species similar to *B. chillanensis* but with larger flowers; *polyantha*, large clusters salmon-red fruits, 6 ft., W. China; *rubrostilla*, probably the finest of all fruiting Barberries, large, translucent amber-red berries, hybrid; *Sieboldii*, rounded bush, 3 ft., yellowish-red berries, Japan; *Thunbergii*, brilliant autumn foliage and red fruits, 6 ft., Japan and China, and numerous varieties; *vulgaris*, 'Common Barberry', 10 ft., Europe inc. Britain, several named varieties; *Wilsonae*, coral red berries, 4 ft., spreading, W. China, and vars. *Stapfiana*, *subaulialata* and *globosa*; *yunnanensis*, large bright red berries, 4 ft., spreading, W. China.

EVERGREEN SPECIES CULTIVATED: *B. actinacantha*, yellow flowers, blue fruits, 4 ft., partly evergreen, Chile; *Aquifolium*, see Mahonia; *asiatica*, rather tender, 6 ft., Himalaya; *Bergmanniae*, 6 ft., W. China; *buxifolia*, purple fruits, erect, 10 ft., Chile, var. *nana*, dwarf to 15 in., compact, seldom flowering; *candidula*, low rounded to 2 ft., bright yellow flowers, purple fruits, China; *Chenaultii*, hybrid, 5 ft.; *Coxii*, newer species similar to *B. Hookeri*, leaves white beneath, 5 ft., Burma; *Darwinii*, dense growing and suitable for hedging, flowers orange, April and May, plum-coloured fruits, 10 ft., Chile; *Gagnepainii*, handsome, compact, 5 ft., black fruits, W. China; *heterophylla*, half-evergreen, to 5 ft., Chile; *hakeoides*, to 12 ft., Chile; *Hookeri*, dense growing, to 4 ft., makes good hedge, fruits dark purple, Himalaya; *hypokerina*, similar to last, foliage white beneath, fruits violet, Burma; *japonica*, see Mahonia; *Julianae*, dense growth making good screen to 8 ft., very hardy, dark blue fruits, Cent. China; *linearifolia*, newer species, bright orange-red flowers, fruit blue-black, 8 ft., Chile; *lologensis*, natural hybrid, flowers gold suffused apricot, magnificent shrub, 8 ft., Chile; *pruinosa*, lustrous dark green leaves, purple fruits, vigorous to 8 ft., S.W. China; *Sargentiana*, similar to *B. Hookeri*, erect to 6 ft., hardy, Cent. China; *Soulieana*, similar to last, very stiff habit, Cent. China; *stenophylla*, strong-growing graceful hybrid to 10 ft., golden flowers, and numerous varieties including *coccinea* and *corallina*; *verruculosa*, arching shoots, shiny foliage, pruinose flowers, slow-growing to 3 ft.

Berchemia—*Rhamnaceae*. Hardy climbing deciduous shrubs. Scarcely meriting cultivation. First introduced early eighteenth century.

CULTURE OF HARDY SPECIES: Soil, sandy loam. Position, against south wall,

well-drained border. Plant, Oct. to Feb. Prune, Feb., cutting off soft points of strong shoots and removing weak shoots altogether.

PROPAGATION: Hardy species by cuttings of shoots 6 in. long inserted half their depth and 3 in. apart in sheltered border in Oct.; greenhouse species by cuttings at any time.

SPECIES CULTIVATED: *B. racemosa*, greenish, Sept., 6 to 8 ft., Japan; *scandens* (syn. *B. volubilis*), 'Supple Jack', white, July, 10 to 12 ft., U.S.A.

Bergamot, see *Monarda didyma*; **-Mint**, see *Mentha aquatica*.

Bergenia—*Saxifragaceae*. Hardy perennial plants with large, more or less evergreen foliage, some richly coloured in winter. Formerly known as *Saxifraga* and *Megasea*.

CULTURE: Any good, deep, fairly heavy soil. Position, light shade beneath tall trees.

PROPAGATION: By division of old plants in spring; seeds.

SPECIES CULTIVATED: *B. Beesiana*, rich rose, early summer, 12 in., Himalaya; *cordifolia* (syns. *B. Megasea* and *Saxifraga cordifolia*), pink, spring, 12 in., Siberia; and var. *purpurea*, deep reddish-purple, taller panicles; *crassifolia* (syn. *Saxifraga crassifolia*), pink, early summer, 15 in., Siberia, Mongolia; *ligulata*, white or pink, spring, 12 to 15 in., Himalaya; *Stracheyi*, white, early summer, 9 to 12 in., Himalaya.

Berkheya (South African Thistle)—*Compositae*. Ornamental thistle-like herbs.

CULTURE: Soil, porous, gritty with lime rubble. Position, hot and sunny.

PROPAGATION: By seeds in spring, pot seedlings in young state and plant in permanent quarters when well rooted.

SPECIES CULTIVATED: *B. macrocephala*, orange, July, 3 ft., Natal; *purpurea*, bluish-purple, Aug. to Sept., 3 ft., S. Africa; *radula* (syn. *B. Adlumii*), yellow, July, 3 to 6 ft., Transvaal.

Bermuda Buttercup, see *Oxalis cernua*; **-Lily**, see *Lilium longiflorum* var. *eximium*; **-Satinflower**, see *Sisyrinchium bermudiana*.

Bertolonia—*Melastomaceae*. Stove trailing foliage plants, purplish underneath and various metallic colours above. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, leaf-mould and sand. Position, well-drained pans in shady, close stove or warm greenhouse. Pot, Feb. or March. Temp., Sept. to March 60° to 70°, March to Sept. 75° to 85°. Water daily April to Sept., once or twice a week at other times.

PROPAGATION: By cuttings inserted in light soil in pots or pans under bell-glass in temp. 75° in spring.

SPECIES CULTIVATED: *B. Houtteana*, leaves green and carmine, 6 in., Brazil; *maculata*, leaves pink and purple, 6 in. Brazil; *marmorata*, leaves silvery white and purple, 6 in., Brazil; *pubescens*, leaves light green, with chocolate band, Ecuador.

Bessera—*Liliaceae* (or *Amaryllidaceae*). Half-hardy bulbous plant. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat, and coarse silver sand. Position, well-drained pots in cold greenhouse. Pot, Oct. or Nov. Water freely during active growth. Keep more or less dry after foliage dies down until new growth begins. Requires plenty of sun. May be grown in well-drained border outdoors at foot of a south wall.

PROPAGATION: By offsets removed and treated as old bulbs at potting time.

SPECIES CULTIVATED: *B. elegans*, 'Coral Drops', scarlet, summer, 18 in. to 2 ft., Mexico.

Beta (Beet)—*Chenopodiaceae*. Esculent vegetables, sometimes grown as ornamental foliage plants. Leaves crimson, green or white. First introduced mid-sixteenth century.

CULTURE OF BEETROOT: Sandy soil manured for previous crop best. Sow globe type in April to provide early roots and make main sowing of long type for

storage in mid-May in drills 1 in. deep, 15 in. apart. Thin seedlings in June to 8 in. Lift roots in Nov. and store in cool shed. Crop takes 18 weeks from time of sowing till ready for use. Seeds retain their vitality up to 10 years old. Two ounces of seed will sow a row 50 ft. long.

CULTURE OF SPINACH BEET: Sow seeds $1\frac{1}{2}$ in. deep in rows 18 in. apart in April. Thin seedlings in May to 9 in. apart in row. Use leaves only, like spinach. Soil and manure as for beetroot.

CULTURE OF ORNAMENTAL BEET: Sow seeds $\frac{1}{4}$ in. deep in boxes of light soil in temp. 60° to 70° in March; transfer seedlings to cold frame in April and plant in beds in flower garden in May.

SPECIES CULTIVATED: *B. vulgaris*, 'Beet', 'Beetroot', Sugar Beet', 'Mangel', thick roots of various forms, colours and sizes, var. *Cicla*, 'Spinach Beet', 'Chard', and some forms with variegated, scarlet, white and green ornamental foliage.

Betel Nut, see *Areca Cathecu*.

Bethlehem Sage, see *Pulmonaria saccharata*.

Betonica, see *Stachys*.

Betony, see *Stachys*.

Betula (Birch)—*Betulaceae*. Hardy ornamental deciduous trees and shrubs. Timber used for veneering purposes and making fish casks and bobbins. Bark used for tanning fish nets. Some 40 species are known to cultivation. The native Silver Birch, known variously as *B. alba*, *B. verrucosa* and *B. pendula*, should be referred to under the last of these names.

CULTURE: Soil, ordinary. Position, sheltered or exposed, in valleys, hills or mountain slopes; good seaside and town trees. Plant, Oct. to March.

PROPAGATION: By seeds sown on the surface of sandy soil in sheltered borders in March, seeds to be simply pressed in, not covered. Transplant seedlings when one year old. Dwarf birches by layering shoots in Oct., named varieties of Silver Birch by grafting on young stock of the type plant.

SPECIES CULTIVATED: *B. caerulea-grandis*, silver trunk, large foliage, 30 ft., N. Hemisphere; *Koehnei*, hybrid between *B. pendula* and *B. papyrifera*; *lenta*, 'Black' or 'Cherry Bark Birch', 70 ft., N.E. America; *lutea*, 'Yellow Birch', yellow stems, 90 ft., N.E. America; *mandshurica*, wide spreading to 50 ft., N.E. Asia, W. China, vars. *japonica* and *szechuanica*; *nigra*, 'River Birch', 60 ft., fine species with shaggy cream-coloured trunk, grows equally well near or away from water, N.E. America; *papyrifera*, 'Paper Birch', white stem to 60 ft., bark used for making canoes, N. America, var. *kenaica*, red stems and lesser stature; *pendula*, 'Silver Birch', 50 ft., Europe, including Britain, vars. *dalecarlica*, 'Swedish Birch', finely cut leaves, slender weeping habit, *fastigiata*, slender upright habit, *purpurea*, leaves purple, *tristis*, tall, slender, weeping, *Youngii*, the best weeping form for small gardens.

Biarum—*Araceae*. Hardy herbaceous perennials.

CULTURE: Soil, gritty, not too rich. Position, cool, preferably slightly shaded, between rocks.

PROPAGATION: By seeds.

SPECIES CULTIVATED: *B. Davisii*, spathe yellowish-green and pinkish-brown, Nov., 3 in., Crete; *tenuifolium*, spathe dull purple and green with long worm-like purple spadix, June to July, 9 in., S. Europe.

Bidens (Bur Marigold)—*Compositae* Annual and perennial herbs.

CULTURE: Soil, ordinary. Position, sunny border. Plant perennials, Oct. or April.

PROPAGATION: Perennials by division of old plants in April; annuals by seed sown $\frac{1}{4}$ in. deep in sandy soil in temp. 70° in March, transplanting seedlings outdoors in May.

SPECIES CULTIVATED: *B. ferulifolia*, yellow, summer, 1 to 3 ft., annual or biennial, Central America; *humilis*, yellow, July, dwarf, perennial, Mexico;

serrulata (syn. *B. grandiflora*), yellow, July, 3 ft., Mexico. For *B. atrosanguinea* and *B. dahlioides*, see *Cosmos*.

Bifrenaria—*Orchidaceae*. A genus of epiphytic orchids. In a few species the scapes are racemose, others have short erect spikes, with 1 to 5 large flowers, their pseudo-bulbs pyramidal, leaves usually one, hard, leathery persistent.

CULTURE: Compost, largely loam fibre with one part in three of peat and sphagnum moss. A decided rest is needed in winter in a temp. of 50°, many will withstand less if dry; summer 60° to 80°. Water may then be freely given. Drainage should be ample.

PROPAGATION: By division of plants or by healthy back bulbs taken off when repotting in the spring, and laid in a damp place till growth is seen.

SPECIES CULTIVATED: *B. atropurpurea*, purplish red, spring, summer, Brazil; *aurantiaca*, yellow, Jan. to March, S. America; *Harrisoniae*, 1 to 1½ ft., ivory white, lip purple, densely haired, winter, spring, Brazil; *inodora*, greenish yellow with purple flushes, winter, spring, Brazil; *pubigera*, white, rose-flushed, lip deeper rose, whitish haired, summer, Brazil; *tyrianthina*, purple-violet, summer, Brazil.

Bigelowia, see *Chrysothamnus*.

Bignonia, see *Anisostichus*.

Bilberry see *Vaccinium Myrtillus*.

Billardiera (Apple Berry)—*Pittosporaceae*. Half-hardy evergreen climber. First introduced early nineteenth century.

CULTURE: Soil, good ordinary, well drained. Position, south or south-west wall in mild districts only. Plant, April. Prune away all weak or dead shoots in April.

PROPAGATION: By cuttings inserted in sandy soil in a temperature of 55°; also by seeds sown in above temperature.

SPECIES CULTIVATED: *B. longiflora*, creamy-white to purple, succeeded by blue edible berries, summer, 5 ft., Tasmania.

Billbergia—*Bromeliaceae*. Stove, flowering, epiphytic, evergreen plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous loam, rough peat, leaf-mould and silver sand. Pot, March. Water freely always. Good drainage essential. Temp., Sept. to March 65° to 75°, March to Sept. 70° to 80°.

PROPAGATION: By large-sized offshoots inserted singly in small pots of sandy peat in temp. 85° in April.

SPECIES CULTIVATED: *B. iridifolia*, scarlet, yellow and crimson, 18 in., Brazil; *Liboniana*, red, green and blue, 1 to 2 ft., Brazil; *Lietzei*, rosy-pink, 1 ft., Brazil; *Morelii*, blue, pink and rose, 1 ft., Brazil; *nutans*, yellowish-green with blue margins, 1½ ft., Brazil; *pallenscens* (syn. *B. Bakeri*), green and violet, 18 in., Brazil; *vittata*, red and violet, 18 in. to 2 ft., Brazil; *zebrina*, 1 ft., Brazil.

Bindweed, see *Convolvulus* and *Calystegia*.

Binotia—*Orchidaceae*. A monotypic epiphyte near to *Cochlidia*.

CULTURE: Compost, etc., as for *Odonotglossum*; winter temp. should be 55°.

PROPAGATION: By division of large plants or by back bulbs as with *Bifrenaria*.

SPECIES CULTIVATED: *B. braziliensis*, flowers 6 to 15, green with an olive-brown suffusion, lip white, tinged green, yellow haired, autumn, Brazil.

Birch, see *Betula*.

Bird Cherry, see *Prunus Padus*; **-of Paradise Flower**, see *Strelitzia Reginae*.

Birdseye Maple, see *Acer saccharinum*; **-Primrose**, see *Primula farinosa*.

Bird's-foot Stonecrop, see *Sedum pulchellum*; **-Trefoil**, see *Lotus corniculatus*; **-Violet**, see *Viola pedata*.

Bird's Nest Fern, see *Asplenium Nidus*.

Birthwort, see *Aristolochia*.

Biscutella—*Cruciferae*. Biennial or perennial plants.

CULTURE: Any reasonably good soil. Position, sunny pocket in the rock garden.

PROPAGATION: By seeds sown in light sandy soil.

SPECIES CULTIVATED: *B. laevigata*, yellow, 9 in., summer, Europe.

Bishop's Cap, see *Mitella*; **-Hat**, see *Epimedium alpinum*.

Bitter Almond, see *Prunus Amygdalus* var. *amara*; **-Cress**, see *Cardamine*;

-Nut, see *Carya amara*; **-Root**, see *Lewisia rediviva*; **-Vetch**, see *Lathyrus vernus*;

-wort, see *Gentiana* and *Lewisia*.

Bixa—*Bixaceae*. Stove evergreen flowering tree, source of annatto dye. First introduced late seventeenth century.

CULTURE: Compost, two parts loam, one part peat and silver sand. Pot, March. Water freely March to Sept., moderately other times. Temp., Sept. to March 60° to 70°, March to Sept. 75° to 85°.

PROPAGATION: By cuttings of shoots six to twelve months old, inserted in small pots of sandy soil in temp. 85°, June to Aug, and by seeds sown in heat.

SPECIES CULTIVATED: *B. Orellana*, 'Annatto', pink, summer, W. Indies.

Black Hellebore, see *Helleborus niger*; **-Maple**, see *Acer saccharinum* var. *nigrum*;

-Poplar, see *Populus nigra*; **-thorn**, see *Prunus spinosa*; **-wood Acacia**, see *Acacia melanoxylon*.

Blackberry, see *Rubus*; **American- or Cutleaved-**, see *Rubus laciniatus*;

Evergreen Thornless-, see *R. ulmifolius* var. *inermis*.

Black-eyed Susan, see *Thunbergia alata* and *Rudbeckia hirta*.

Blacking Plant, see *Hibiscus Rosa-sinensis*.

Blackstonia (Yellow Centaury, Yellow-wort)—*Gentianaceae*. Hardy biennials. Suitable for large gardens only.

CULTURE: Soil, heavy loam. Position, moist borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shady beds outdoors in July, transplanting seedlings into flowering positions in Oct.

SPECIES CULTIVATED: *B. perfoliata* (syn. *Chlora perfoliata*), yellow, June, 1 ft. Britain.

Bladder Fern, see *Cystopteris*; **-Herb**, see *Physalis Alkekengii*; **-Nut**, see *Staphylea pinnata*; **-Senna**, see *Colutea arborescens*; **-wort**, see *Utricularia*.

Blaeberry, see *Vaccinium Myrtillus*.

Blandfordia—*Liliaceae*. Greenhouse, fleshy-rooted, evergreen flowering plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, loam and silver or river sand. Pot, Oct. Good drainage, firm potting and moderate-sized pots essential. Water freely May to Aug., moderately Aug. to Oct and Feb. to May, none at other times. Temp., Oct to Feb. 40° to 50°, Feb. to April 50° to 55°, April to Oct. 55° to 65°.

PROPAGATION: By seeds and offsets or divisions of old plants at potting time.

SPECIES CULTIVATED: *B. grandiflora* (syn. *B. Cunninghamii*), crimson, July, 2 ft., Australia; *flammea*, yellow, June, 18 in., Australia; *marginata*, crimson, summer, 2 ft., Australia; *nobilis*, orange, July, 2 ft., Australia.

Blanket Flower, see *Gaillardia aristata*.

Blazing Star, see *Liatris*.

Blechnum—*Polypodiaceae*. Stove, greenhouse and hardy evergreen ferns. Genus formerly known as *Lomaria* is included here. First introduced late seventeenth century.

CULTURE OF STOVE SPECIES: Compost, equal parts loam, leaf-mould, peat and sand. Pot, Feb. or March. Position, shady. Water abundantly April to Sept., moderately afterwards. Temp., March to Sept. 70° to 80°, Sept. to March 60°

to 70°. Syringe tree species daily Feb. to Sept. Like many other plants classed as stove plants, blechnums often thrive as well in greenhouse temperatures.

CULTURE OF GREENHOUSE SPECIES: Compost, as above. Pot, March or April. Position, shady. Water freely March to Oct., moderately afterwards. Syringe as advised for stove species. Temp., March to Sept. 55° to 65°, Sept. to March 50° to 55°.

CULTURE OF HARDY SPECIES: Soil, two parts sandy peat, one part loam and pounded limestone. Position, shady rockeries. Plant, Oct. to April. Water freely in dry weather. Protect *B. penna marina* in very severe weather.

PROPAGATION: By spores sown on fine sandy peat in well-drained pans in temp. 80° at any time; dwarf species by division of plants, Oct. or April.

STOVE SPECIES CULTIVATED: *B. attenuatum* (syn. *Lomaria attenuata*), Tropics; *blechnoides* (syn. *B. unilaterale*), 6 to 12 in., Trop. America; *fraxineum* (syn. *B. longifolium*), 1 to 2 ft., W. Indies; *gibbum* (syn. *Lomaria gibba*), to 5 ft., New Caledonia, (var. *platyptera* of the trade belongs to this species); *gracile*, 1 ft., Brazil; *occidentale*, 1 to 2 ft., W. Indies.

GREENHOUSE SPECIES CULTIVATED: *B. auriculatum* (syn. *B. hastatum*), 1 to 2 ft., S. America; *australe* (syn. *Lomaria pumila*), fronds to 2 ft., Cape of Good Hope; *brasiliense*, 'Brazilian Tree Fern', 2 to 3 ft., Brazil, Peru; *capense*, (syn. *Lomaria procera*), New Zealand; *cartilagineum*, 1 to 2 ft., Australia; *discolor* (syn. *Lomaria discolor*), Australia; *glandulosum*, 2 ft., Mexico; *lanceolata* (syn. *Lomaria lanceolata*), New Zealand; *Patersonii* (syn. *Lomaria Patersonii*), dwarf, Australia; *polypodioides*, 1½ ft., Brazil; *serrulatum*, 1½ ft., Brazil; *tabulare* (syn. *Lomaria Boryana*), W. Indies.

HARDY SPECIES CULTIVATED: *B. penna marina* (syn. *Lomaria alpina*), New Zealand, Tasmania, etc.; *spicant* (syn. *Lomaria spicant*), 'Hard Fern', 'Deer Fern', Europe (Britain), N. America, Asia.

Bleeding Heart, see *Dicentra spectabilis*.

Blessed Thistle, see *Cnicus benedictus*.

Bletia—*Orchidaceae*. Terrestrial orchids. First introduced early eighteenth century.

CULTURE: Compost, equal parts loam and leaf-mould with crushed potsherds. Pot, March. Position, pots with 2 in. of drainage in each. Water freely March to Aug., moderately Aug. to Oct., very little, or none, afterwards. Temp., March to Sept. 65° to 75°, Sept. to March 60° to 65°. Resting period winter. Repot in early spring. Press the bulbs into the compost but do not cover. Flowers appear at base of new pseudo-bulb, several on tall slender scapes, usually brightly coloured though not large.

PROPAGATION: By division of plants after flowering.

SPECIES CULTIVATED: *B. alta* (syn. *B. verecunda*), purple, W. Indies; *catenulata*, lilac or purple-lilac, summer, Brazil, Peru; *campanulata*, deep purple, summer, Mexico; *Shepherdii*, red-purple and yellow, summer, 3 ft., Jamaica; *Sheratiana*, rose-purple and deep purple, spring, summer, New Granada; *patula*, deep violet-rose, early summer, Haiti.

Bletilla—*Orchidaceae*. A small terrestrial genus. Habit much the same as *Bletia*, but scapes are terminal and side lobes of the lip are convolute over the column.

CULTURE: Compost, three parts fibrous loam, one part peat with an addition of leaf-mould and sand. *B. striata*, better known as *Bletia hyacinthina*, is hardy in sheltered places in the south of England. It cannot withstand hard frost, and in other localities should be placed in a frost-proof house; should not be dried out in winter.

PROPAGATION: By division.

SPECIES CULTIVATED: *B. striata* (syn. *Bletia hyacinthina*), whitish or lilac, very variable, in some purple, in others white, summer, China, Japan.

Blighia—*Sapindaceae*. Tender tree cultivated in tropics for its edible fruits. First introduced late eighteenth century.

CULTURE: Soil, sandy loam and peat. Position, borders in warm greenhouses. Temp., March to Sept. 75° to 90°, Sept. to March 65° to 75°.

PROPAGATION: By cuttings of half-ripened shoots rooted in sandy soil under hand-glass in temp. 75° to 85°.

SPECIES CULTIVATED: *B. sapida*, 'Akee', straw- or magenta-coloured fruit 3 in. long, 30 to 40 ft., W. Africa.

Blood Berry, see *Rivina humilis*; **-Lily**, see *Haemanthus*; **-root**, see *Sanguinaria canadensis*.

Bloomeria—*Liliaceae* (or *Amaryllidaceae*). Half-hardy bulbous plant. First introduced mid-nineteenth century.

CULTURE: Soil, light, sandy. Position, warm border or rockery. Plant bulbs 2 to 3 in. deep, and 3 in. apart, Sept. to Nov.

PROPAGATION: By offsets planted, as directed for bulbs.

SPECIES CULTIVATED: *B. crocea* (syn. *B. aurea*), yellow, July, 1 ft., California; *Clevelandii*, yellow, July, 1 ft., California.

Blue Alpine Daisy, see *Aster alpinus*; **-Beard**, see *Caryopteris incana*; **-bell**, see *Endymion nonscriptus*; **-berry**, see *Vaccinium corymbosum*; **-Cedar**, see *Cedrus atlantica glauca*; **-Cowslip**, see *Pulmonaria angustifolia*; **-Cohosh**, see *Caulophyllum thalictroides*; **-Cupidone**, see *Catananche caerulea*; **-Dawnflower**, see *Ipomoea Leari*; **-Dicks**, see *Dicholostemma pulchellum*; **-Grass**, see *Carex*; **-Gum Tree**, see *Eucalyptus globulus*; **-Lace Flower**, see *Trachymene caerulea*; **-leaf Wattle**, see *Acacia cyanophylla*; **-Lotus of the Nile**, see *Nymphaea caerulea*; **-Marguerite**, see *Felicia amelloides*; **-Pincushion**, see *Brunonia australis*; **-Poppy**, see *Meconopsis betonicifolia*; **-Spiraea**, see *Caryopteris*; **-Willow**, see *Salix caerulea*.

Bluets, see *Houstonia caerulea*.

Blumenbachia—*Loasaceae*. Slightly tender plants with leaves armed with stinging hairs like those of nettles. First introduced early nineteenth century.

CULTURE: Soil, warm, sandy. Position, warm and sheltered.

PROPAGATION: By seeds under glass.

SPECIES CULTIVATED: *B. Hieronymii*, red, 9 to 12 in., summer, biennial, S. America; *insignis*, white, July, trailing, annual, Montevideo; *multifida*, red, July, annual, Buenos Aires.

Bocconia, see *Maclaya*.

Boenninghausenia—*Rutaceae*. Herbaceous perennial plants allied to *Ruta*.

CULTURE: Soil, deep loam, well drained. Position, warm, sheltered spot protected from the east.

PROPAGATION: By seeds sown in spring.

SPECIES CULTIVATED: *B. albiflora* (syn. *Ruta albiflora*), white, 12 to 18 in., autumn, Japan, Himalaya.

Bog Arum, see *Calla palustris*; **-Asphodel**, see *Narthecium*; **-Bean**, see *Menyanthes trifoliata*; **-Berry**, see *Vaccinium Oxycoccus*; **-Myrtle**, see *Myrica Gale*; **-Violet**, see *Pinguicula vulgaris*.

Bollea—*Orchidaceae*. A genus of pseudo-bulbless epiphytic orchids, at one time included in *Zygopetalum*. Tufted habit, scapes shorter than leaves, bearing a large single flower with a ribbed or furrowed crest on the lip.

CULTURE: Compost, two parts osmunda or similar fibre, equal quantity of sphagnum moss and an addition of crushed potsherds. Baskets or pans are preferable to pots. South-west or westerly aspect and shading in bright weather. A moist atmosphere and water throughout the year are required, avoid draughts. If necessary, repot in spring. Winter temp. at night 65° or more, summer 70°, exceeded on warm days.

PROPAGATION: By division of plants, which, however, resent disturbance.

SPECIES CULTIVATED: *B. coelestis*, bluish-violet, 3 to 4 in. across, late summer,

Colombia; *Lalindei*, rose, yellow and white, late summer, Colombia; *Lawrenceana*, white marked violet, lip passing to violet-purple, summer, Colombia; *violacea* (syn. *Huntleya violacea*), violet, shading to white, summer, Guiana.

Boltonia—*Compositae*. Hardy herbaceous perennials. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary moist loam. Position, sunny or shady borders. Plant, Oct. or April.

PROPAGATION: By division of roots in April.

SPECIES CULTIVATED: *B. asteroides*, 'False Chamomile', white, July, 4 to 5 ft., N. America; *latisquama*, blue-violet, 2 to 8 ft., N. America.

Bomarea—*Amaryllidaceae* (or *Alstroemeriaceae*). Greenhouse, climbing, flowering perennials. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, leaf-mould, loam and sand. Pot or plant, March. Position, large pots, tubs or beds, well drained. Water freely April to Sept., moderately other times. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pots of light sandy soil in temp. 65° in March; division of roots in March.

SPECIES CULTIVATED: *B. acutifolia*, red, yellow and green, autumn, 5 to 6 ft., Mexico; *Banksii*, pink and greenish-white, spotted, hybrid; *cantabrigiensis*, reddish-orange, autumn, 8 ft., hybrid; *Carderi*, rose, autumn, 6 to 8 ft., Colombia; *edulis*, crimson, July, 5 to 6 ft., Trop. America; *multiflora*, red and orange, autumn, 6 to 8 ft., Colombia and Venezuela; *patacensis* (syn. *B. conferta*), carmine-rose, Aug., 6 to 8 ft., Colombia.

Bona-Nox, see *Calonyction aculeatum*.

Bonavist, see *Dolichos Lablab*.

Bonstedtia, see *Epimedium*.

Boophone, *Amaryllidaceae*. Half-hardy or greenhouse bulbous-rooted plants. First introduced late eighteenth century. Also known as Buphane.

CULTURE: Compost, equal parts peat, loam and sand. Pot, Sept. Water only when new growth begins, then give moderate quantity; cease to give any after leaves turn yellow. Temp., Sept. to Nov. 50° to 55°, Nov. to March 55° to 65°, March to Sept. 65° to 75°. Plants must have full exposure to sun.

PROPAGATION: By offsets inserted in small pots and grown like large bulbs.

SPECIES CULTIVATED: *B. ciliaris*, purple, summer, 1 ft.; *disticha*, purple, summer, 1 ft., S. Africa.

Borago (Borage)—*Boraginaceae*. Hardy annual and perennial plants. Common species (*B. officinalis*) used for flavouring claret-cup and as a bee food.

CULTURE: Soil, ordinary. Position, sunny rockeries, dry banks. Sow seeds of common borage annually in March where required to grow, afterwards thinning seedlings to 8 in. apart.

PROPAGATION: Annuals by seeds sown as above; perennials by division of roots in April.

SPECIES CULTIVATED: *B. laxiflora*, blue, Aug., 1 ft., Corsica, perennial; *officinalis*, 'Common Borage', annual, blue, summer, 1 to 2 ft., Britain.

Borecole or **Kale**, see *Brassica fimbriata*.

Boronia—*Rutaceae*. Greenhouse, flowering, evergreen shrubs. Flowers fragrant. First introduced late eighteenth century.

CULTURE: Compost, two parts fibrous peat, one part silver sand and pounded charcoal. Pot directly after flowering. Drain the pots well and make compost quite firm. Cut off points of young shoots when 3 in. long to promote bushy growth. Water freely April to Sept., moderately afterwards. Place plants in semi-shady position outdoors June to Aug. Temp., Sept. to March 45° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By cuttings of firm young shoots inserted in sandy soil, in temp. 55° June to Aug., under bell-glass.

SPECIES CULTIVATED: *B. elatior*, rosy carmine, May, 3 to 4 ft., Australia; *heterophylla*, rose, May, 2 to 3 ft., Australia; *megastigma*, maroon and yellow, April, 18 in., Australia; *polygalifolia*, pink, 2 ft., June, Australia; *serrulata*, 'Australian Native Rose', rose, June, 2 to 3 ft., Australia.

Boston Ivy, see *Parthenocissus tricuspidata*.

Botrychium—*Ophioglossaceae*. Hardy and half-hardy deciduous ferns.

CULTURE: Compost, equal parts sandy loam and peat. Position, moist, shady rockery, or in grass. Half-hardy species in cool greenhouse. Plant, April. Water freely in dry weather during summer.

PROPAGATION: By division of roots in April.

SPECIES CULTIVATED: *B. dissectum*, 1 ft., America; *lunaria*, 'Moonwort', Moon Fern', 4 to 5 in., Britain; *matricariaefolium*, 4 to 6 in., Europe; *ternatum*, 6 to 12 in., New Zealand, not hardy in Britain; *virginianum*, 16 to 18 in., N. Temp. Zone.

Bottle-brush Tree, see *Callistemon*.

Bougainvillea—*Nyctaginaceae*. Stove climbing deciduous plants. Coloured bracts chief floral attraction. First introduced early nineteenth century.

CULTURE: Compost, two-thirds turfy loam, one-third leaf-mould and sand. Pot or plant, Feb. Position, *B. glabra* in pots with shoots trained round wire trellis; *B. speciosa* in bed 3 ft. wide and 18 in. deep, branches and shoots being trained up roof. Prune shoots of previous year's growth to within 1 in. of base annually in Feb. Water abundantly March to Sept., moderately Sept. to Nov., none afterwards. Temp., Feb. to May 55° to 60°, May to Sept. 65° to 75°, Sept. to Feb. 50° to 55°.

PROPAGATION: By cuttings of young shoots 3 in. long, removed with small portion of branch attached, inserted in 2 in. pots of sandy soil, under bell-glass in temp. 70° to 80°, March, April or May.

SPECIES CULTIVATED: *B. Buttiana* (syn. *B. 'Mrs. Butt'*, *B. 'Crimson Lake'*), crimson, 5 to 15 ft., prob. Brazil, var. 'Mrs. McLean' (var. 'Orange King'); *glabra*, rose, summer, 5 to 8 ft., Brazil, var. *Sanderiana*, rich rose; *spectabilis*, lilac-rose, summer, 15 ft., Brazil, var. *superba*, deep rose. There are several named varieties listed by nurserymen.

Bouncing Bet, see *Saponaria officinalis flore pleno*.

Boussingaultia—*Basellaceae*. Half-hardy tuberous-rooted climber with fragrant flowers. First introduced early nineteenth century.

CULTURE: Soil, light, sandy. Position, back wall of greenhouse or south wall or fence outdoors during summer. Plant tubers in small pots in temp. 55° in March, for transplanting outdoors in June, or in bed in Feb. for greenhouse culture. Lift outdoor tubers in Oct. and store in sand during winter; those in greenhouse bed leave undisturbed. Water freely in summer, none in winter.

PROPAGATION: By inserting tubercles removed from the stems in sandy soil in temp. 55° in spring or autumn.

SPECIES CULTIVATED: *B. baselloides*, 'Madeira Vine', white, autumn, 6 to 8 ft., Ecuador.

Bouvardia—*Rubiaceae*. Greenhouse, flowering, evergreen shrubs with fragrant flowers. First introduced late eighteenth century.

CULTURE: Compost, equal parts fibrous loam, leaf-mould, peat and silver sand. Pot, March. Prune, Feb., shortening shoots of previous year's growth to within 1 in. of their base. Water moderately Feb. to May, and Aug. to Nov., freely May to Aug., little Nov. to Feb., Temp., Feb. to Sept. 55° to 75°, Sept. to Feb. 55° to 60°. Place plants in cold frame from June to Sept.

PROPAGATION: By cuttings of young shoots 2 in. long, inserted in pots of sandy compost in March in temp. 65°; cuttings of roots inserted in similar soil in spring; division at potting time.

SPECIES CULTIVATED: *B. angustifolia*, red, Sept., 2 ft., Mexico; *Humboldtii*, white, winter, 2 to 3 ft.; *jasminiflora*, white, winter, 2 ft., S. America; *ternifolia* (syn. *B. triphylla*), scarlet, winter, 2 ft., Mexico; and numerous hybrids as, 'The Bride', white.

Bower Plant see *Pandorea jasminioides*.

Bowkeria—*Scrophulariaceae*. Tender evergreen shrub.

CULTURE: An attractive shrub of 10 ft. for a sunny wall, in warm districts only.

PROPAGATION: By cuttings from young shoots placed in a propagator with bottom heat, or under a bell-glass in an intermediate house. Seeds, if available, are also used.

SPECIES CULTIVATED: *B. Gerardiana*, large white calceolaria-like flowers, 10 ft.

Bowstring Hemp, see *Sansevieria*.

Box, see *Buxus*; **Brisbane-**, see *Tristania conferta*; **-Elder**, see *Acer Negundo*; **-Holly**, see *Ruscus aculeatus*; **-Thorn**, see *Lycium*.

Boykinia—*Saxifragaceae*. Hardy perennial plants with creeping rootstocks.

CULTURE: Soil, moist, deep. Position, water-side or cool border, *B. Jamesii*, in rock-garden.

PROPAGATION: By seed or division of old plants.

SPECIES CULTIVATED: *B. aconitifolia*, cream, 3 to 4 ft., summer, E. United States; *major*, creamy-white, 2 to 3 ft., summer, California; *Jamesii*, crimson, 4 to 6 in., June, Colorado.

Brachycome—*Compositae*. Half-hardy annual. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny bed or border.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shallow boxes of light soil in temp. 50° to 55° in March, transplanting seedlings outdoors in May; or outdoors in April where plants are to flower.

SPECIES CULTIVATED: *B. iberidifolia*, 'Swan River Daisy', blue or white, summer, 1 ft., Australia. Many forms of this species are now offered by seedsmen.

Brachypodium—*Gramineae*. Hardy annual flowering grass. Inflorescence suitable for drying for winter decorations.

CULTURE: Soil, ordinary. Position, sunny borders. Sow seeds outdoors in April. Cut inflorescence when in full flower.

SPECIES CULTIVATED: *B. distachyon*, 'False Brome Grass', summer, 9 in., Europe.

Brachysema—*Leguminosae*. Greenhouse, climbing, evergreen flowering plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould and silver sand. Pot, Feb. Position, well-drained pots or tubs, or beds 3 ft. wide and 18 in. deep; shoots to be trained round wire trellis or up the roof and fully exposed to sun. Water freely April to Aug., moderately other times. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in sandy soil in temp. 55° in March; cuttings of shoots inserted in similar soil and temp. under bell-glass in June, July or Aug.; layering shoots in Sept.

SPECIES CULTIVATED: *B. latifolium*, crimson and scarlet, April, 8 to 10 ft., Australia; *lanceolatum*, scarlet, yellow and white, spring, 3 ft., Australia; *undulatum*, violet, March, 3 to 6 ft., Australia.

Bracken, see *Pteridium*.

Brahea—*Palmae*. Greenhouse fan-leaved palm. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Pot, Feb. Water freely in summer, moderately other times. Temp., Sept. to March 55° to 60°, March to Sept. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 85° in March.
SPECIES CULTIVATED: *B. dulcis*, 3 ft., Mexico.

Brake Fern, see *Pteridium*.

Bramble, see *Rubus*.

Brasenia—*Nymphaeaceae* (or *Cabombacaceae*). Hardy aquatic for pond or aquarium; difficult to establish. First introduced late eighteenth century.

CULTURE: Soil, loam and charcoal. Position, shallow ponds or lakes, 1 to 1½ ft. deep, or aquarium. Plant in pots or baskets, sinking these in the water during April or May.

PROPAGATION: By offsets in May, and seed.

SPECIES CULTIVATED: *B. Schreberi*, (syn. *B. peltata*), 'Water Shield' purple, summer, N. America, Asia, Africa, Australia.

Brassavola—*Orchidaceae*. An epiphytic genus, the majority with slender short pseudo-bulbs, bearing a longer terete leaf. Flowers, from apex of bulb, usually few, with narrow sepals and petals and a heart-shaped lip, white or green shaded, fragrant in some.

CULTURE: Cattleya compost, pans which can be suspended are preferable as several are of pendent habit. Water should be freely given while the plants are growing. In winter a long rest is beneficial, and the plants may be hung near the glass in the Cattleya house in autumn. Some confusion exists in the genus owing to the similarity of several forms given specific names.

PROPAGATION: By division when plants are large enough, in spring.

SPECIES CULTIVATED: a selection: *B. cucullata*, flowers solitary, white, with narrow sepals and petals, 4 in. long, the lip 2 in. long, its side lobes with their inner edges encircling the column, their outer edges fringed, various seasons, Venezuela, Guatemala; *fragrans*, whitish or yellow tinged, purple-spotted at base, early autumn, Brazil; *nodosa*, flowers in twos or fours, fairly large, white or green tinged, autumn, Cent. America; *Perrinii*, white, shaded green, lip veined green, early summer, Brazil. There are several other species.

Brassia—*Orchidaceae*. An epiphytic genus with showy flowers, large, but with attenuated segments. The spikes produced as in *Miltonias*, from the base of the pseudo-bulb, which is often compressed and carries one or two leaves.

CULTURE: Compost, as for *Odontoglossum* with the exception of *B. verrucosa*, *B. brachiata*, and a very small-flowered species *B. elegantula*, which succeed in the cool house; all the species mentioned require a winter temp. of 60°, higher in summer, a moist atmosphere, but avoid water lodging on the leaves. A decided rest cannot be given as growths are often present in the winter. Shading must be given in summer.

PROPAGATION: By division of plants large enough, in spring.

SPECIES CULTIVATED: *B. antherotes*, rich brown and yellow, handsome, summer, Trop. America; *brachiata*, large, greenish-white with brown-purple spots, early summer, Guatemala; *caudata*, greenish-yellow, spotted dark brown, summer, W. Indies, Brazil; *elegantula*, small, light green, white, brown flushed, summer, Mexico; *Gireoudiana*, brown, red-brown and yellow, variable, summer, Costa Rica; *Lanceana*, variable, yellow, brown-spotted, lip creamy-white, late summer, Brazil, Venezuela; *Lawrenceana*, fragrant, yellow with dark-purple spots, spring, summer, Brazil, etc., var. *longissima*, larger, sepals 7 in. long, spring, summer, Costa Rica; *maculata*, greenish-yellow, spotted brown, early summer, Jamaica; *verrucosa*, greenish with dark green warts, spring, summer, Mexico, Guatemala. Several other species and varieties are known.

Brassica—*Cruciferae*. Hardy annual and biennial plants with esculent roots or foliage. Species have been much improved by breeding and selection. The exact origin of most of the cultivated species is unknown but many have been grown in Europe, including Britain, for hundreds of years. Flowers are yellow in practically all species.

CULTURE OF BORECOLE OR KALE: Sow seeds $\frac{1}{2}$ in. deep in drills 6 in. apart, in

April or May. Transplant seedlings when third leaf forms to 4 in. apart in nursery bed. Plant out permanently 18 in. apart in rows 2 ft. asunder in June or July. Season of use, Nov. to April; Hungry Gap variety is in season April to May.

CULTURE OF BROCCOLI: For autumn use sow seeds $\frac{1}{2}$ in. deep in shallow boxes of light soil in temp. 65° in Feb.; transplant seedlings 3 in. apart in light soil in cold frame in April or May, plant out 2 ft. apart in rows 2 ft. apart in June. For winter use sow seeds of Purple Sprouting variety $\frac{1}{2}$ in. deep in drills 6 in. apart in open garden in April; transplant seedlings 6 in. apart each way in June. Plant permanently 2 ft. apart each way in July. For spring use sow seeds of late Purple Sprouting or Leamington type as for winter kinds; plant out in July.

CULTURE OF BRUSSELS SPROUTS: Sow mid-March to mid-April, and plant May to June 2 ft. apart in rows 3 ft. apart. Season of use, Nov. to April. Cut, not break, sprouts when gathering; do not remove tops till sprouts are finished.

CULTURE OF CABBAGE: Choice of varieties enables cabbage to be grown all the year round. For summer and autumn use: sow mid- to end of April, transplant 2 ft. apart each way June to July, watering in. For winter use: sow during May or early June and transplant 2 ft. apart each way July or early Aug. For spring use: sow early Aug. and transplant mid-Sept. to mid-Oct. 18 in. by 9 in. Keep ground cultivated in all cases and dress with sulphate of ammonia when in full growth. Sow Colewort in July and plant out 12 in. apart each way in Sept.

CULTURE OF CAULIFLOWER: Sow seeds $\frac{3}{4}$ in. deep during April and transplant 6 in. apart in May, plant out 18 in. apart in rows 2 ft. asunder in June. When hearts begin to form, turn leaves over them to protect from sun and frost.

CULTURE OF KOHL-RABI: Sow seeds thinly outdoors in March. Thin seedlings to 3 in. apart in May and plant out 2 ft. apart in rows 3 ft. asunder in June. Gather swollen stems for use when the size of a tennis ball.

CULTURE OF SAVOY: Sow seeds outdoors in March for early crop and at end of April for main crop. Plant dwarf varieties 12 in. apart in rows 15 in. asunder; tall kinds 2 ft. apart each way. Gather for use after autumn frost.

CULTURE OF TURNIP: Sow seeds in Feb., March, April, May, June and July for a continuous supply. Make drills $\frac{1}{2}$ in. deep and 1 ft. apart, dust seedlings occasionally with lime or soot to keep off turnip flea-beetle, thin to 6 in. apart when rough leaf forms. May be forced on hotbed in Feb. or March, sow seeds broadcast and cover lightly with fine soil, keep moist. Turnips ready for use eight weeks after sowing. Swede turnips should be sown in May, thinned early, and brought to maturity for winter use.

CULTURE OF MUSTARD: Soil, ordinary. Position, open borders. Sow seeds on surface of soil, water, and cover with mats or boards till they germinate; or in drills $\frac{1}{2}$ in. deep and 6 in. apart. Make first sowing end of March and follow on with successional sowings every five days until Sept. Gather for salads when 1 in. high. Two crops sufficient off one piece of ground. Indoor Culture: Sow seed on surface of light soil in shallow boxes, moisten with tepid water, cover with paper, slate or board and place in warm position in greenhouse or room. Sow every three days for succession, two crops may be grown in same soil. Seeds may be sown on flannel kept moist in a warm room at any time of year.

CULTURE OF TRONCHUDA: Soil, ordinary rich. Position, sunny. Sow seeds thinly outdoors in April. Transplant seedlings when 3 in. high, 6 in. apart in nursery bed and plant out finally 3 ft. apart each way in June. Gather outer leaves first for their midribs, and hearts last of all.

PROPAGATION: By seed.

SPECIES CULTIVATED: *B. caulorapa*, 'Kohl-rabi'; *chinensis*, 'Chinese Mustard', 'Pak-Choi'; *fimbriata*, 'Scotch Kale', 'Borecole'; *hirta* (syn. *B. alba*), 'White Mustard'; *juncea*, 'Leaf Mustard', 'Indian Mustard'; *Napobrassica*, 'Swede', 'Rutabaga'; *Napus*, 'Rape'; *nigra*, 'Black Mustard', source of table mustard; *oleracea*, vars. *acephala*, 'Field Kale', *botrytis*, 'Cauliflower', 'Broccoli', *capitata*, 'Cabbage', *gemmifera*, 'Brussels Sprouts', *italica*, 'Sprouting Broccoli', 'Calabresse'; *pekinensis*, 'Chinese Cabbage', 'Pe-Tsai', 'Celery

Cabbage', leaves used as greens, white heart for salad, annual or biennial; *per-
viridis*, 'Spinach Mustard'. *purpuraria*, 'Purple Mustard', stems and ribs of leaves
purple; *Tronchuda*, 'Portugal Cabbage'.

× **Brassocattleya**—*Orchidaceae*. A bigeneric hybrid between the genera *Brassa-
vola* and *Cattleya*, requiring similar treatment to the *Cattleyas*.

CULTURE: As *Cattleya*.

PROPAGATION: As *Cattleya*.

SPECIES CULTIVATED: *B. Lindleyana*, bluish-white, lip white marked rose,
autumn, Brazil.

× **Brassocattlaelia**—*Orchidaceae*. Trigeneric hybrids between the genera
Brassavola, *Laelia* and *Cattleya*, most of which have been given English verna-
cular names.

× **Brassolaelia**—*Orchidaceae*. Bigeneric hybrids between *Brassavola* and *Laelia*.

Bravoa—*Amaryllidaceae*. Half-hardy bulbous plant. First introduced early
nineteenth century.

OUTDOOR CULTURE: Soil, light, sandy. Position, well-drained sunny border.
Plant bulbs 4 in. deep in Sept. Protect in winter with a covering of cinder ashes.

GREENHOUSE CULTURE: Put four bulbs in a 5 in. pot, well drained, in Oct.
Cover with ashes in cold frame until Jan., then remove to greenhouse. Water
moderately until foliage turns yellow, then keep soil dry.

PROPAGATION: By offsets treated as advised for bulbs.

SPECIES CULTIVATED: *B. geminiflora*, 'Scarlet Twin Flower', bright red, 1½ ft.,
Mexico; *sessiliflora*, white, May, 1½ ft., Mexico; *singuliflora*, white, May, 2 ft.,
Mexico.

Brazil Nut, see *Bertholletia excelsa*.

Breadfruit, see *Artocarpus communis*.

Bredia—*Melastomaceae*. Greenhouse herbaceous perennial or shrub.

CULTURE: As *Miconia*.

PROPAGATION: As *Miconia*.

SPECIES CULTIVATED: *B. hirsuta*, pink, 2 to 3 ft., Japan; *tuberculata*, pink with
crimson stems and leaf-stalks, Sept., 1 ft., China.

Brevoortia, see *Brodiaea*.

Bridal Wreath, see *Francoa*.

Brittonastrum—*Labiatae*. Hardy herbaceous perennial. Sometimes included
in *Agastache* or *Cedronella*.

CULTURE: Soil, ordinary. Position, sunny, open. Plant in spring or early
autumn.

PROPAGATION: By careful division in spring.

SPECIES CULTIVATED: *B. canum*, pink, July, 3 ft., Mexico; *mexicanum* (syn.
Agastache mexicana), purple, 2 to 3 ft., June to Aug., Mexico.

Briza—*Gramineae*. Hardy ornamental flowering grasses, the inflorescence of
which is valuable for mixing with cut flowers, or drying for winter decoration.

CULTURE: Soil, ordinary. Position, sunny beds, borders or banks.

PROPAGATION: By seeds sown ½ in. deep in April where plants are required to
flower. Flowers should be cut and dried for winter decoration when fully
developed.

SPECIES CULTIVATED: *B. maxima*, 'Pearl Grass', June to July, 1 ft., Medit.
Region; *media*, 'Quaking Grass', June to July, 1 ft., Britain; *minor*, 6 in.,
Europe; *rotundata*, June to July, 1 ft., Mexico.

Broccoli, see *Brassica oleracea* var. *botrytis*; **Sprouting-** or **Calabresse**, see
B. oleracea var. *italica*.

Brodiaea—*Liliaceae* (or *Amaryllidaceae*). Hardy bulbous plants. First introduced
early nineteenth century.

CULTURE: Soil, rich sandy loam. Position, warm, well-drained border. Plant in Sept and Oct., 4 in. deep and apart.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in cold frame in March; offsets of the corms.

SPECIES CULTIVATED: These are now placed in four genera as follows:

BRODIAEA: *B. californica*, lilac or violet, June, 9 to 12 in., California; *coronaria* (syns. *B. grandiflora*, *Hookera coronaria*), lilac or violet, June, 3 to 9 in., N.W. America; *elegans*, violet, June, 6 to 12 in., Oregon, California.

DICHELOSTEMMA: *D. Ida-Maia* (syns. *Brodiaea coccinea*, *Brevoortia Ida-Maia*), 'Fire-cracker Flower', bright red, green and white, June, 1 to 3 ft., California, Oregon; *pulchellum* (syn. *Brodiaea capitata*), violet, June, 1 to 2 ft., W.N. America; *volubile* (syns. *Brodiaea volubilis*, *Stropholirion volubile*), pink, June, $1\frac{1}{2}$ to 5 ft., California.

IPHEION: *I. uniflorum* (syns. *Beauverdia uniflora*, *Brodiaea uniflora*, *Milla uniflora*, *Triteleia uniflora*), 'Spring Starflower', pale blue or white, March to April, 6 in., has a true bulb (not corm), smells of garlic when bruised, Argentine.

TRITELEIA: *T. crocea* (syn. *Brodiaea crocea*), yellow, June, 4 to 12 in., Oregon, California; *grandiflora* (syn. *Brodiaea Douglasii*), blue, June, 9 in. to 2 ft., W.N. America; *hyacinthina* (syns. *Brodiaea hyacinthina*, *Hesperoscordum hyacinthinum*), white, sometimes lilac, July, 6 in. to 2 ft., W.N. America; *ixioides* (syn. *Brodiaea ixioides*), yellow, June, 6 in. to 2 ft., California; *laxa* (syn. *Brodiaea laxa*), blue, June, 6 in. to 2 ft., Oregon, California.

Brome Grass, see *Bromus*.

Bromelia—*Bromeliaceae*. Stove terrestrial herbs with stiff, spiny-margined leaves in basal rosettes and flowers in heads or panicles.

CULTURE: Compost, equal parts fibrous loam, rough peat, leaf-mould and silver sand. Pot, March. Water freely always. Good drainage essential. Temp., Sept. to March 65° to 75°, March to Sept. 70° to 80°.

PROPAGATION: By large-sized offshoots inserted singly in small pots of sandy peat in temp. 85° in April.

SPECIES CULTIVATED: *B. fastuosa*, purple, Aug., 4 ft., Brazil; *Pinguin*, red, March, 3 ft., Trop. America.

Bromheadia—*Orchidaceae*. A genus both terrestrial and epiphytic. Inflorescence terminal on dwarf or tall stems with distichous, rather rigid leaves, the size varying in different species. Only one species calls for mention.

CULTURE: Fibrous peat and sand in well-drained pots as water is required throughout the year, freely in summer. Winter temp. 70° at night, summer reaching the tropical on sunny days.

PROPAGATION: By division of the plants in spring when repotting.

SPECIES CULTIVATED: *B. palustris* (syn. *B. Finlaysonianum*), flowers fragrant, produced in succession, medium size, white or pink tinged, summer, Borneo, Malaya, etc.

Brompton Stock, see *Mathiola incana*.

Bromus (Brome Grass)—*Gramineae*. Hardy ornamental annual grass. Useful for drying for winter decoration.

CULTURE: Soil, ordinary. Position, open borders. Cut flowers when fully developed.

PROPAGATION: By seeds in Sept. or April where plants are to grow.

SPECIES CULTIVATED: *B. briziformis*, 2 ft., Caucasus.

Broom, see *Cytisus* and *Genista*; **Butcher's-**, see *Ruscus aculeatus*.

Broughtonia—*Orchidaceae*. Epiphytic orchids allied to *Epidendrum*. Pseudobulbs close set, often overlapping with the leaves, light glaucous green. The slender scapes, 18 in., are terminal.

CULTURE: Cattleya compost, small pans suspended near the glass. Expose

early in autumn to light. Winter temp. 60°, summer 65° to 80°. Very little, if any, water in winter. A rest is necessary.

PROPAGATION: By division of plants when repotting in spring.

SPECIES CULTIVATED: *B. domingensis* (syns. *B. lilacina*, *Laeliopsis domingensis*), light rose with deeper veins, lip with white-haired crimson lines, margin fringed, summer, autumn, San Domingo; *sanguinea* (syns. *B. coccinea*, *Epidendrum sanguineum*), crimson, flowers rounded, summer, autumn, Jamaica.

Broussonetia (Paper Mulberry)—*Moraceae*. Hardy deciduous tree with ornamental foliage; leaves large, lobed, mulberry-shaped. Plants unisexual; bark used for paper-making in the Far East. First introduced mid-eighteenth century.

CULTURE: Any ordinary garden soil. Plant, Oct. to March.

PROPAGATION: By cuttings inserted in sandy soil in cold frame in Oct., or suckers in Oct. or Nov.

SPECIES CULTIVATED: *B. papyrifera*, 20 ft., China.

Browallia—*Solanaceae*. Greenhouse flowering annuals. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam and leaf-mould, with little sand. Sow seeds $\frac{1}{8}$ in. deep in fine light soil in March in temp. 55° to 65°. When seedlings appear, transplant three or four into each 5-in. pot, keep on a shelf in greenhouse, and water moderately. Apply weak manure water in May and June. Will flower in cool greenhouse. Temp., March to June 55° to 60°. Seedlings may be planted outdoors in June to flower during summer.

SPECIES CULTIVATED: *B. americana* (syns. *B. demissa*, *B. elata*), blue, July, 9 in., Peru; *grandiflora*, blue with yellow tube, July, 2 ft., Peru; *speciosa*, purple, varying to blue, July, 2 ft., Peru; *viscosa*, violet blue, 1 to 2 ft., Colombia.

Brownea—*Leguminosae*. Stove, evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat and loam, little sand. Pot, Feb. or March. Water moderately in summer, occasionally at other times. Temp., Sept. to March 55° to 60°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings of firm shoots inserted in sandy peat, in temp. 80° under bell-glass, in spring.

SPECIES CULTIVATED: *B. Ariza*, red, June, 10 to 20 ft., Colombia; *Birschellii*, rose, Aug., 10 ft., Venezuela; *Crawfordii*, scarlet, summer, 10 to 12 ft., hybrid; *grandiceps*, red, June, 10 ft., Venezuela.

Brown-eyed Susan, see *Rudbeckia*.

Brownleea—*Orchidaceae*. A small terrestrial genus closely allied to *Disa*.

CULTURE: Compost and position, as given for *Disa*, but water less frequently in winter. Winter temp. around 55°, in summer 60° and higher; shading is required.

PROPAGATION: By offsets, if they appear, in spring.

SPECIES CULTIVATED: *B. caerulea*, pale blue with violet dots, height varying between 6 and 8 in., Trop. Africa.

Bruckenthalia—*Ericaceae*. Dwarf evergreen, heath-like flowering shrub, suitable for carpeting ledges of rockery in which choice bulbs are grown.

CULTURE: Soil, peat and leaf-mould. Will grow in soil containing a moderate amount of lime. Position, sunny rockeries. Plant in spring.

PROPAGATION: By division of plants, seeds or cuttings, in spring.

SPECIES CULTIVATED: *B. spiculifolia*, 'Spike Heath', pink, summer, 6 in., Cent. Europe.

Brugmansia, see *Datura*.

Brunfelsia—*Solanaceae*. Stove evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, four parts each fibrous peat and leaf-mould, one part loam and sand. Position, pots in plant stove. Pot immediately after flowering;

good drainage and firm potting essential. Prune moderately after flowering. Pinch off points of young shoots when latter are 6 in. long. Water moderately Oct. to March, freely afterwards. Syringe freely March to Aug. Apply liquid manure to healthy plants in summer. Temp., Oct. to March 50° to 55°, March to Oct. 60° to 70°.

PROPAGATION: By cuttings 2 to 3 in. long, inserted in sand under bell-glass in temp. 60° to 70°, Feb. to Aug.

SPECIES CULTIVATED: *B. americana*, pale yellow or white, June, 4 to 8 ft., W. Indies; *calycina* (syn. *Franciscea calycina*), purple, fragrant, summer, 2 ft., Brazil, and vars. *floribunda* and *macrantha*; *latifolia*, white, lavender or purple, winter or early spring, 2 to 3 ft., Trop. America; *undulata*, white, 3 ft., Jamaica.

Brunnera—*Boraginaceae*. Small herbaceous genus formerly included in *Anchusa*.

CULTURE: Soil, ordinary. Position, sunny borders.

PROPAGATION: By division.

SPECIES CULTIVATED: *B. macrophylla* (syn. *Anchusa myosotidiflora*), blue, spring, 1½ ft., Siberia, Caucasus.

Brunonia—*Goodeniaceae*. Slightly tender perennial rock plant.

CULTURE: Soil, warm, sandy. Position, sheltered pocket in the rock garden.

PROPAGATION: By seeds sown in spring.

SPECIES CULTIVATED: *B. australis*, 'Blue Pincushion', blue, 9 in., summer, Tasmania.

Brunsvigia—*Amaryllidaceae*. Greenhouse bulbous plants. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Pot, Sept. Water only when new growth begins, then give moderate quantity; cease to give any after leaves turn yellow. Temp., Sept. to Nov. 50° to 55°, Nov. to March 55° to 65°, March to Sept. 65° to 75°. Plants must have full exposure to sun.

PROPAGATION: By offsets inserted in small pots and grown similar to large bulbs.

SPECIES CULTIVATED: *B. gigantea*, red, July, 1 ft.; *Josephinae*, scarlet, July, 18 in.; *Kirkii*, 18 in., Trop. E. Africa. Some American botanists include *Amaryllis Belladonna* (syn. *Callicore rosea*) in this genus as *B. rosea*.

Brussels Sprouts, see *Brassica oleracea*, var. *gemmifera*.

Bryophyllum, see *Kalanchoe*.

Buckeye, see *Aesculus Pavia*.

Buckthorn, see *Rhamnus*.

Buddleia (Butterfly Bush)—*Loganiaceae*. Hardy and half-hardy evergreen and deciduous shrubs; many are fragrant and are singularly attractive to butterflies. First introduced mid-eighteenth century.

CULTURE: Any light garden soil, including chalky loam. Full sun is preferred. Tender species on west walls or in pots in cool greenhouse. Plant, Oct. or April. Prune *B. Davidii* group and *B. Fallowiana*, by cutting hard back annually before growth starts, and *B. alternifolia*, by occasionally cutting out some of the older wood immediately after flowering.

PROPAGATION: Aug. cuttings in cold frames in sandy soil. Seed may also be sown indoors in March, but *B. Davidii* and varieties will produce many worthless forms.

SPECIES CULTIVATED: *B. alternifolia*, deciduous and hardy, habit of weeping willow, to 12 ft., flowering in May on one-year-old wood, blossoms lavender, fragrant, China; *Colvillei*, half-hardy, deciduous, requiring wall protection in cold areas, large rose-coloured flowers, 20 ft., Himalaya; *Davidii*, better known as *B. variabilis*, deciduous, to 15 ft., Cent. China, var. *Veitchiana*, dark lavender, *nanhoensis*, a 3-ft. shrub for confined spaces; *Fallowiana*, powder blue, grey foliage, 8 ft., W. China; *Farrerii*, deciduous, pale lavender, April, 10 ft., N.W. China; *Forrestii*, large foliage, reddish-maroon flowers, 8 ft., W. China; *globosa*, 'Orange Ball Tree', half-evergreen, to 15 ft., Chile.

Buffalo-berry, see *Shepherdia argentea*; **-Currant**, see *Ribes aureum*.

Buffelhorn Wood, see *Burchellia capensis*.

Bugbane, see *Cimicifuga americana*.

Bugle see *Ajuga*; **-Lily**, see *Watsonia*.

Bugloss, see *Anchusa*.

Bulbinella—*Liliaceae*. Hardy herbaceous tuberous-rooted perennial. First introduced mid-nineteenth century.

CULTURE: Soil, rich, well drained, containing plenty of leaf-mould. Position, partially shaded warm border. Plant in spring.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *B. Hookeri* (syn. *Chrysobactron Hookeri*), white, summer, 2 to 3 ft., New Zealand.

Bulbocodium—*Liliaceae*. Hardy bulbous plant flowering in March before the leaves. Sometimes classified under *Colchicum*. First introduced mid-seventeenth century.

CULTURE: Soil, ordinary. Position, sunny or shady beds or borders. Plant 3 in. deep and 3 in. apart in Sept. Lift and replant bulbs every second year.

PROPAGATION: By offsets obtained when lifting the bulbs.

SPECIES CULTIVATED: *B. vernum*, 'Spring Meadow Saffron', purple, March, 6 in., Alps, var. *versicolor*, prettily tinted.

Bulbophyllum—*Orchidaceae*. 1,000 species or more, epiphytic, distributed widely in the East and also found in central America. The genus varies greatly, including deciduous, evergreen, minute and large-growing forms. Equal variation is seen in the flowers, the prevailing character of which is that the lip is delicately articulated at its base, so that it readily moves up and down, freedom being given to the downward motion by the lower sepals being partly twisted so leaving a space between their bases. In a number the lips are haired. A selection only of the most interesting species is given here.

CULTURE: Compost, osmunda fibre and sphagnum moss in equal quantities, mixed with finely crushed potsherds. Small pans, which can be suspended, for the smaller-growing kinds, baskets for the larger. Deciduous species and those with hard-textured pseudo-bulbs, however small, and hard leaves, require a decided rest in winter. Softer-growing kinds require water throughout the year. Discrimination must be used. A moist atmosphere with shading not too heavy, a tropical or semi-tropical temperature in summer, and a winter temperature of 65° to 70°, suits the species enumerated.

PROPAGATION: By division of the plants.

SPECIES CULTIVATED: *B. barbigerrum*, purple, dusky mahogany, with dark-haired labellums, many flowers, summer, West Cent. Africa; *Binnendijkii*, spring, Borneo; *Dearei*, like *Lobbii*, but the white lip marked with purple, summer, Borneo, Philippines; *Ericssonii*, summer, New Guinea; *Fletcherianum*, red to purplish, spring, summer, leaf fleshy, up to 20 in. long, glaucous, New Guinea; *Gentilii*, peduncle 18 in., flowers in succession, yellow, purple marked, autumn, W. Africa; *grandiflorum*, large, olive-green with whitish maculations, summer, autumn, New Guinea; *lemniscatoides*, small, purplish, sepals with a white, rose-spotted, ribbon-like appendage, various seasons, Java; *lemniscatum*, deciduous, small green and maroon, each sepal-tip developed into a flattened greenish-red filament, summer, Burma; *Lobbii*, large, buff yellow, various seasons, Burma to Java, var. *colossus*, 4 in. across; *longisepalum*, large, whitish, suffused, spotted and veined with claret-red, summer, New Guinea; *mirum*, sabot-shaped in twos, yellowish, spotted and marked red purple, lip hidden, petals edged with purplish and white filaments, active in sunshine, various seasons, Sumatra; *penicillium*, greenish-brown, haired, in a swollen purplish rachis, winter, Burma; *saltatorium*, small-growing, greenish-brown, haired lip, summer, Sierra Leone; *Sillemianum*, orange yellow, lip bright mauve, Burma; *virescens*, large greenish-yellowish

flowers, lips marked with red, flowers up to 12 in a circle, often 12 in. across, lower sepals pointing outward, dorsal sepals forming central cone, curious and attractive, but with unpleasant odour, various seasons, Amboina.

Other species with curious or beautiful flowers are: *B. comosum*, Burma; *Dayanum*, various seasons, Burma; *Frostii*, summer, Annam; *leopardinum*, summer, Khasia; *hirtum*, winter, Burma; *macranthum*, summer, Burma; *orthoglossum*, summer, Philippines; *vitiense*, summer, Fiji Isles, and many other species.

Bullace, see *Prunus domestica* var. *insititia*.

Bulrush, see *Scirpus*.

Bunya-Bunya Pine, see *Araucaria Bidwillii*.

Bupthalmum (Yellow Oxeye)—*Compositae*. Hardy herbaceous perennials. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, open sunny border. Plant, Oct. or March.

PROPAGATION: By division of old plants in Oct. or March; seeds sown outdoors in April.

SPECIES CULTIVATED: *B. salicifolium*, yellow, June, 18 in., S. Europe; *speciosissimum* (syn. *Telekia speciosissima*), yellow, June, 2 ft., Europe; *speciosum* (syn. *Telekia speciosa*), yellow, June, 5 ft., Europe.

Bupleurum—*Umbelliferae*. Slightly tender evergreen shrub and hardy perennials. *B. fruticosum* is a loose-spreading shrub to 5 ft. and is useful for windswept seaside localities, especially in chalky districts. Requires wall protection inland. First introduced late sixteenth century.

CULTURE OF SHRUBBY SPECIES: Soil, ordinary. Position, warm border. Plant, Oct. or April.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny borders or rockeries. Plant, Oct. or March.

PROPAGATION: Perennial species by seeds sown outdoors in April; division in March. Shrubby species by cuttings inserted in sandy peat in cold frame in Sept.; also by seeds.

SHRUBBY SPECIES CULTIVATED: *B. fruticosum*, yellow, July, 5 ft., Medit.

PERENNIAL SPECIES CULTIVATED: *B. aureum*, yellow, 9 in., June to Aug. Europe; *Candollei*, yellow, leaves glaucous, 1 ft., June to Aug., Europe; *petraeum*, yellow, June, 6 in., Europe; *stellatum*, yellow, June, 9 in., S. Europe.

Bur Marigold, see *Bidens*.

Burbidgea—*Zingiberaceae*. Stove herbaceous flowering perennial. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, leaf-mould and loam. Position, large pots, tubs or beds. Plant, March. Water freely March to Aug., moderately other times.

PROPAGATION: By division of roots in April.

SPECIES CULTIVATED: *B. nitida*, orange red, summer, 3 ft., Borneo; *schizochila*, orange-yellow, summer, Malaya.

Burchellia—*Rubiaceae*. Stove flowering evergreen shrub.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Pot, March. Water freely April to Sept., moderately other times. Temp., Sept to March 55° to 60°, March to Sept. 65° to 75°.

PROPAGATION: By cuttings of young shoots inserted in sandy peat under bell-glass in temp. 75° in March, April or May.

SPECIES CULTIVATED: *B. capensis*, 'Buffelhorn Wood', scarlet, March to May, 3 ft., Cape of Good Hope.

Burnet, see *Sanguisorba*; **-Rose**, see *Rosa spinosissima*.

Burning Bush, see *Dictamnus*.

Burr Oak see *Quercus macrocarpa*.

Bush Clover, see *Lespedeza*; **-Honeysuckle**, see *Diervilla*; **-Mallow**, see *Lavatera Olbia*.

Bushman's Poison, see *Acokanthera venenata*.

Butcher's Broom, see *Ruscus aculeatus*.

Butomus (Flowering Rush)—*Butomaceae*. Pretty hardy perennial for shallow water.

CULTURE: Soil, ordinary. Position, in shallow water on margins of ponds, lakes, etc. Plant, March to May.

PROPAGATION: By division of roots in March or April.

SPECIES CULTIVATED: *B. umbellatus*, 'Flowering Rush', rose, summer, 2 to 3 ft., Europe incl. Britain.

Butter and Eggs, see *Linaria vulgaris*; **-nut**, see *Juglans cinerea*; **-wort**, see *Pinguicula*.

Buttercup, see *Ranunculus*.

Butterfly Bush, see *Buddleia*; **-Flower**, see *Schizanthus*; **-Iris**, see *Moraea*; **-Orchid**, see *Oncidium Papilio*; **-Pea**, see *Clitoria*; **-Tulip**, see *Calochortus*; **-weed**, see *Asclepias*.

Button Bush, see *Cephalanthus occidentalis*; **-Snakeroot**, see *Liatris pycnostachya*.

Buxus (Box)—*Buxaceae*. Hardy evergreen shrubs with small stiff leaves.

CULTURE: Soil, ordinary. Position, open or shady banks or shrubberies; choice kinds on lawns. Plant, March, April, Sept. or Oct. Dwarf box (*B. sempervirens suffruticosa*) used for edgings. Plant divisions with roots attached in shallow trench 6 in. deep in Oct., Nov. or March. Allow plants to nearly touch each other and tips about 2 in. above soil. Press soil firmly. Trim plants April or Aug. Nursery yard of box will make 3 yd. of edging. Box hedges, trench soil 3 ft. deep and 3 ft. wide, add decayed manure and plant ordinary green box 12 in. high about 12 in. apart in Sept. or Oct. Trim annually in May and July.

PROPAGATION: By cuttings of young shoots 3 in. long in shady border in Aug. or Sept.; division of old plants in Oct. or March; layering in Sept. or Oct.

SPECIES CULTIVATED: *B. balearica*, 8 ft., Balearic Is.; *microphylla*, 3 ft., often prostrate, Japan, var. *japonica* has various forms; *sempervirens*, to 20 ft., Europe, N. Africa, W. Asia, and numerous varieties including *argentea*, *aurea*, *Handsworthiensis*, *microphylla*, *myrtifolia*, *pyramidata*, *rosmarinifolia*, *suffruticosa*.

Cabbage, see *Brassica oleracea* var. *capitata*; **-Lettuce**, see *Lactuca sativa* var. *capitata*; **-Palm**, see *Sabal Palmetto*; **Portugal-**, see *Brassica Tronchuda*; **-Rose**, see *Rosa centifolia*.

Cabomba (Fanwort)—*Nymphaeaceae*. Useful oxygenators for the cold-water aquarium, with fan-like submerged leaves and rounded floating foliage, not hardy. First introduced early nineteenth century.

CULTURE: Small slips planted in aquarium compost, or inserted as cuttings in tiny pots of loam submerged in tank, any time during growing period.

PROPAGATION: By cuttings as described.

SPECIES CULTIVATED: *C. caroliniana* (syn. *C. aquatica*), white with yellow spots, Trop. America.

Cactus, see *Aporocactus*, *Ariocarpus*, *Cereus*, *Coryphantha*, *Echinocactus*, *Echinocereus*, *Echinopsis*, *Epiphyllum*, *Ferocactus*, *Gymnocalycium*, *Mammillaria*, *Melocactus*, *Nopalxochia*, *Notocactus*, *Opuntia*, *Pediocactus*, *Pelecypora*, *Pereskia*, *Rhipsalis*, *Schlumbergera*, *Selenicereus*, *Stenocactus*, *Zygocactus*.

Caesalpinia—*Leguminosae* (or *Caesalpinaceae*). Slightly tender deciduous and stove evergreen shrubs. First introduced early eighteenth century.

CULTURE OF STOVE SPECIES: Compost, two parts peat or loam, one part leaf-mould, half-part silver sand. Position, pots in light part of stove or outdoors during July and Aug. Pot, Feb. or March. Water freely March to Oct.,

moderately afterwards. Temp., March to Oct. 70° to 80°, Oct. to March 55° to 65°.

OTHER SPECIES: Soil, ordinary. Position, warm sheltered shrubberies or sunny walls. Plant, Oct. to Feb. Prune merely to keep in good shape.

PROPAGATION: Stove species by seeds sown in light sandy soil in temp. 75° to 85° in spring; cuttings of short young shoots inserted singly in small pots filled with pure sand under bell-glass in temp. 75° to 85° in summer. Hardier species by seeds sown in sandy soil in cold frame at any time.

SPECIES CULTIVATED: *C. Coriaria*, 'Divi-divi', 20 to 30 ft., reddish-brown pods used for dyeing and tanning, stove, S. America; *japonica*, fern-like foliage, yellow flowers with red anthers, 8 ft., Japan, the most reliable of the hardier species.

Caffer Bread, see *Encephalartos*.

Cakile—*Cruciferae*. Hardy annual.

CULTURE: Soil, sandy. Position, open borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep where plants are to flower in March or April.

SPECIES CULTIVATED: *C. maritima*, 'Sea Rocket', lilac, June, 1 ft., Britain.

Calabresse or Sprouting Broccoli, see *Brassica oleracea* var. *italica*.

Caladium—*Araceae*. Stove, tuberous-rooted, deciduous perennials with arrow-shaped leaves, marked in many colours and patterns. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts turfy loam, peat, leaf-mould, decayed manure, and silver sand. Position, well-drained pots in shade. Pot moderately firmly in pots just large enough to take tubers in Feb. or March; transfer to larger pots in April or May. Water moderately Feb. to April, and Sept. to Nov., freely April to Sept.; keep quite dry Nov. to Feb. Temp., Feb. to Sept. 70° to 80°, Sept. to Nov. 65° to 75°, Nov. to Feb. 55° to 65°. *C. Humboldtii* used as an edging to subtropical beds in summer.

PROPAGATION: By division of tubers in Feb. or March.

SPECIES CULTIVATED: *C. bicolor*, 18 in., S. America, and vars. *Chantinii* and *pictum*; *Humboldtii* (syn. *C. argyrites*), 9 in., Brazil; *marmoratum*, 1 ft., Trop. America; *Schomburgkii*, 18 in., Brazil; *rutescens*, Brazil; *venosum*, Brazil. Many beautiful varieties more generally grown than the species will be found in trade lists.

Calamintha, see *Satureja*.

Calamus (Rattan Palm)—*Palmae*. Stove, evergreen climbing or semi-climbing palms. First introduced early nineteenth century.

CULTURE: Compost, two parts turfy loam, one part leaf-mould and coarse sand. Position, well-drained pots in shade. Pot firmly in March. Water moderately Sept. to March, freely afterwards. Temp., Sept. to March 60° to 65°, March to Sept. 70° to 85°. Train shoots up trellis or rafters.

PROPAGATION: By seeds sown 1 in. deep in light soil, in temp. 80°, in March; by suckers growing from roots, inserted in small pots of light soil under bell-glass in temp. 80°.

SPECIES CULTIVATED: *C. ciliaris*, very slender, climber, Malaya; *leptospadix*, a very graceful species from the Himalaya; *Rotang*, slender, climber, India.

Calandrinia (Rock Purslane)—*Portulacaceae*. Hardy, rather fleshy plants. First introduced early nineteenth century.

CULTURE: Soil, light, moderately rich. Position, sunny rockery for dwarf species; borders for tall species. Plant perennials in April.

PROPAGATION: Annuals by seeds sown $\frac{1}{8}$ in. deep in shallow boxes of light soil in temp. 55° to 60°, in March, transplant seedlings into small pots in April, and plant out in June, or sow seeds outdoors in April, where plants are to flower; perennials by seeds or division of roots in April.

SPECIES CULTIVATED: *C. Burridgei*, rose, small, to 1 ft., annual, S. America; *ciliata*, to 1 ft., purple or white, summer, annual, Peru, Ecuador, var. *Menziesii*, 1½ ft., crimson; *grandiflora*, light purple, summer, 1 ft., Chile; *umbellata*, magenta, all summer, 6 in., Peru.

Calanthe—Orchidaceae. A terrestrial and epiphytic, deciduous and evergreen, orchid. The deciduous section is the more important as hybrids have been produced between the species, their varieties, and the hybrids themselves. A race of winter and spring-flowering forms has been produced superior to the species, extending the flowering season. Their tall spikes and numerous brightly-coloured flowers are of great decorative value. The evergreen section is of less utility and includes many of negligible merit. Pseudo-bulbs in the evergreen section are much smaller, spikes usually produced in the axils of the basal leaves. The inflorescence is racemose in some, approaching corymbose in others. Habit similar to that of *Phaius*.

CULTURE: Deciduous forms—Compost, four parts rough fibrous loam and a fifth part of chopped sphagnum moss, sand and leaf-mould. Species and hybrids have stout, somewhat pyramidal pseudo-bulbs, often constricted centrally, the spikes being produced from the base of the new pseudo-bulb. Repotting should be effected every year, usually in March. The bulbs must not be buried but placed firmly in the top of the compost. Shade for a few days. Drainage about 2 in. Do not water until compost approaches dryness. As roots permeate the compost, water freely, in summer it may be required twice a day. Weak manure water may then be given twice a week or more frequently, varied and strength increased as growth strengthens. Towards winter the leaves will yellow and fall, water must then be decreased or withheld and spikes will be in evidence. After flowering keep quite dry in a temp. of 60°. The growing temp. after repotting should be 65° to 80° with little or no shading. The syringe should never be used. 6 or 7-in. pots will accommodate the large bulbs, which should be potted singly. Manure water must be discontinued as the foliage ripens. Evergreen section—Compost the same as for deciduous kinds but loam should be used in rougher lumps. Free drainage. Repotting every year unnecessary. The section is widely distributed, only the finer species are mentioned. A few hybrids have been raised between the evergreen species, also with deciduous group, and, from both, hybrids have been raised with *Phaius*. Winter temp. 60° to 65°. The species cannot be rested and compost must never be allowed to become sodden. In summer give greater heat and water more freely. Shading from bright sunshine is required.

PROPAGATION: Deciduous—A single bulb potted in spring will develop a new flowering bulb, the old bulb remaining behind it. It usually remains sound and may be separated and potted singly or several placed in a shallow box in the foregoing compost the following spring. Some will flower but, in any case, emit a basal growth. Evergreen—By division of plants at spring potting season.

DECIDUOUS SPECIES CULTIVATED (all winter-flowering): *C. labrosa*, rose purple, Burma; *rosea*, rose to dark rose, Burma; *rubens*, bright to dark red, Malaya; *vestita*, very variable, large white with yellow or red eye, India to Cochin-China, var. *Turneri* (syn. *C. Turneri Regnieri*), more numerous, smaller, variable, later, white to rose red, Cochin-China. Many hybrids, all variable, usually with red to crimson labellums and lighter sepals and petals.

EVERGREEN SPECIES CULTIVATED: *C. biloba*, purplish, lip striped white, Himalaya; *curculigoides*, orange-yellow, summer, autumn, Malacca, Java; *furcata*, white or cream-white, summer, Philippines, Java; *Fostermannii*, yellow to whitish, summer, Burma; *Masuca*, comparatively large, purple-mauve, fine variable species, summer, Ceylon, India; *veratrifolia*, very variable, white in corymbose racemes, widely distributed Ceylon to Java, Australia.

Calathea—Marantaceae. Stove plants with coloured basal tufted leaves. Several species were formerly known as *Maranta*.

CULTURE: Compost, equal parts coarse lumps of loam, peat, leaf-mould and sand. Position, well-drained pots in shade. Pot, March, moderately firmly. Water

freely April to Sept., moderately afterwards. Temp., March to Sept. 70° to 80° Sept. to March 65° to 70°.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *C. angustifolia*, 2 to 3 ft., Trop. America; *Bachemiana*, 9 in., Brazil; *Chantrieri* (syn. *Maranta Chantrieri*), leaves grey and dark green, 1 ft., Brazil; *Closonii*, habitat unknown; *eximia*, 2½ ft., Trop. America; *grandiflora* (syn. *C. flavescens*), 18 in. Brazil; *illustris*, 1 ft., Brazil; *insignis*, 4 to 6 ft., Brazil; *Lietzei*, 2 ft., Brazil; *leopardina*, 2 ft., Brazil; *Lindeniana*, 1 ft., Peru; *Luciana*, 3 ft., Trop. America; *Makoyana*, 3 to 4 ft., Brazil; *ornata*, 1 ft., Brazil; *picta*, 3 to 4 ft., Brazil; *pulchella* (syn. *C. tigrina*), 1 ft., Brazil; *splendida*, 1 to 1½ ft., Brazil; *Vandenheckei*, 2 to 2½ ft., Brazil; *Veitchiana*, 3 ft., Bolivia; *zebrina*, 'Zebra Plant', 2 to 3 ft., Brazil.

Calceolaria (Slipper-flower, Slipper-wort)—*Scrophulariaceae*. Half-hardy or greenhouse, shrubby and herbaceous plants. First introduced early eighteenth century.

CULTURE OF HERBACEOUS KINDS: Sow seeds on surface of fine soil in well-drained pans or shallow boxes in July. Cover box or pan with sheet of glass, and place them under bell-glass or in cold frame. Shade from sun, and keep moderately moist. Transplant seedlings 1 in. apart in fine soil in Aug., transfer them singly into 2 in. pots in Sept., into 5 in. in Oct., and 6 or 7 in. in March. Compost, two parts sandy loam, one part leaf-mould, decayed manure and sand. Water moderately until April, then freely. Apply liquid manure from April till plants are in flower. Temp., Aug. to March 45° to 50°, March to May 50° to 55°. Discard plants after flowering.

CULTURE OF SHRUBBY KINDS: Compost, same as for herbaceous kinds. Position, pots in windows or greenhouses, or in sunny or shady beds outdoors in summer. Pot in March; plant in May. Nip off points of shoots in March to make bushy plants.

CULTURE OF HARDY KINDS: Soil, ordinary, well enriched with leaf-mould. Position, rather moist and partially shaded places in the rock garden. Plant, March or Sept. Water freely during hot, dry weather. Annual species should be sown in the open during March or April.

PROPAGATION: Shrubby kinds by cuttings 3 in. long inserted in sandy soil in cool shady frame in Sept. or Oct., or in pots or boxes in cool greenhouse or window in Sept. Cuttings to remain in frames, etc., till potting or planting time. Hardy kinds by division of roots in March or by seeds sown ¼ in. deep in pans or boxes in cold greenhouse or frame during Feb. or March.

HERBACEOUS SPECIES CULTIVATED: *C. Allardii*, yellow, spring, 1 to 2 ft., hybrid; *amplexicaulis*, yellow, summer, 1 to 2 ft., Peru; *arachnoidea*, purple, June to Sept., 1 ft., Chile; *bicolor*, pale and deep yellow, 2 ft., Peru; *Burbidgei*, yellow and white, autumn and winter, 2 to 3 ft., hybrid; *cana*, white, heavily spotted, 9 to 12 in., Chile; *corymbosa*, yellow and purple, May to Oct., 1 to 1½ ft., Chile; *crenatiflora*, yellow and orange-brown, summer, 1 to 2½ ft., Chile; *Fothergillii*, yellow and red, May to Aug., 6 in., Falkland Islands; *herbacea*, yellow, variously marked, 1 to 2 ft., April to June, garden hybrid; *Pavonii*, yellow and brown, summer, 2 to 4 ft., Peru; *purpurea*, reddish-violet, July to Sept., 1 ft., Chile.

SHRUBBY SPECIES CULTIVATED: *C. alba*, white summer, 1 ft., Chile; *fuchsiae-folia*, yellow, spring, 1 to 2 ft., Peru; *integrifolia* (syn. *C. rugosa*), yellow to red-brown, summer, 1 to 3 ft., Chile, parent of the bedding calceolaria; *thyrsiflora*, yellow, June, 1 to 2 ft., Chile.

HARDY SPECIES CULTIVATED: *C. acutifolia* (syn. *C. polyrhiza* hort.), yellow, June to July, 6 in., Argentine; *biflora* (syn. *C. plantaginea*), yellow, June to July, 1 ft., Patagonia; *Darwinii*, bronze, yellow and white, summer, 4 in., Magellan; *scabiosaefolia*, pale yellow, summer, 1 to 2 ft., Ecuador to Chile, annual; *tenella*, yellow, June, 2 in., Chile.

Caldesia—*Alismaceae*. Waterside plants akin to *Alisma*. Only hardy in south of England.

CULTURE: Soil, ordinary, set crowns just below water level. Plant, spring.

PROPAGATION: By seed; division in spring.

SPECIES CULTIVATED: *C. parnassifolia*, 12 in. rounded foliage, whorls of small white flowers in July, Europe, N. Africa.

Calendula—*Compositae*. Hardy annual.

CULTURE: Soil, ordinary. Position, sunny or shady beds or borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in March or April where plants are to flower. Reproduces itself freely from seed. Useful as a pot plant.

SPECIES CULTIVATED: *C. officinalis*, 'Pot Marigold', 'Scotch Marigold', orange-yellow, summer, 12 in., S. Europe. There are many varieties—see trade lists.

Calico Bush, see *Kalmia latifolia*.

Californian Bluebell, see *Phacelia Whitlavia*; **-Fuchsia**, see *Zauschneria californica*; **-Lace Fern**, see *Cheilanthes gracillima*; **-Laurel**, see *Umbellularia californica*; **-Lilac**, see *Ceanothus integerrimus*; **-Mock Orange**, see *Carpenteria californica*; **-Nutmeg**, see *Torreya californica*; **-Poppy**, see *Eschscholtzia californica*; **-Redwood**, see *Sequoia sempervirens*.

Caliphurria—*Amaryllidaceae*. Greenhouse bulbous-rooted perennial. First introduced early nineteenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould, peat and sand. Position, well-drained pots, sunny. Pot, March, placing one bulb 3 in. deep in a 5 in. pot. Water moderately March to Oct., very little afterwards. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By offsets placed in small pots in March.

SPECIES CULTIVATED: *C. Hartwegiana*, greenish-white, June, 1 ft., Colombia.

Calla—*Araceae*. Hardy aquatic for pond margin. First introduced mid-eighteenth century.

CULTURE: Soil, rich, boggy or muddy. Position, moist bog or shallow pond. Plant, spring.

PROPAGATION: By inserting portions of creeping rootstock in boggy or muddy soil where plants are required to grow.

SPECIES CULTIVATED: *C. palustris*, 'Bog Arum', 'Marsh Calla', white, summer, scarlet berries, 6 in., N. Hemisphere. See also *Richardia*, *Peltandra* and *Zantedeschia*.

Calla Lily, see *Zantedeschia*.

Callianthemum—*Ranunculaceae*. Hardy, herbaceous, perennial rock plants.

CULTURE: Soil, very gritty, well drained. Position, in the rock garden. Good scree or moraine plants.

PROPAGATION: By seeds sown in compost, as above.

SPECIES CULTIVATED: *C. anemonoides*, white, 2 to 3 in., spring, Cent. Alps; *coriandrifolium*, white, 3 in., spring, Alps; *Kernerianum*, white, 2 in., spring, Europe; *rutifolium*, white—sometimes flushed pink, 2 in., spring, Alps.

Callicarpa—*Verbenaceae*. Stove, greenhouse or hardy shrubs with ornamental fruit. Berries borne abundantly in axils of leaves Nov. to May. First introduced early nineteenth century.

CULTURE OF STOVE SPECIES: Compost, equal parts peat and loam with little sand. Position, pots in sunny place. Pot, March. Prune straggly shoots into shape before potting. Water moderately Sept. to March, freely afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 70° to 80°.

CULTURE OF HARDY SPECIES: Soil, ordinary loam. Position, sheltered walls with south aspect in all but mildest part of country. Plant, Nov. Prune previous year's growth fairly severely in Feb.

PROPAGATION OF STOVE SPECIES: By cuttings of young shoots in 2 in. pots of sandy soil in March in temp. 80°. To ensure plenty of berries keep the points of shoots frequently pinched off and all flowers removed until the end of July.

PROPAGATION OF HARDY SPECIES: By cuttings of half-ripened wood in sandy soil under hand-glass during July or Aug.

STOVE SPECIES CULTIVATED: *C. americana*, 'French Mulberry', grey-blue, summer, berries violet-blue, 3 to 6 ft., Southern U.S.A.; *longifolia*, pink or purple, fruits white, Himalaya, China.

HARDY SPECIES CULTIVATED: *C. Bodinieri*, to 10 ft., flowers pink, fruits violet, China, var. *Giraldii*, a newer form for the open border, conspicuous berries and purple-tinted foliage in autumn, 6 ft.; *dichotoma* (syn. *C. purpurea*), to 4 ft., China, Japan; *japonica*, pale pink, Aug., berries violet, 3 to 5 ft., Japan.

Calliopsis, see *Coreopsis*.

Callirrhoe (Poppy Mallow)—*Malvaceae*. Hardy annuals and perennials. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open borders. Plant perennials Oct. or March.

PROPAGATION: Annual species by seeds sown $\frac{1}{16}$ in. deep in pans of light soil in temp. 55° to 65° in March, transplanting seedlings outdoors in May, or where plants are to flower in April; perennials by seeds sown $\frac{1}{16}$ in. deep outdoors in April, or cuttings of young shoots inserted in sandy soil in cold frame in spring.

ANNUAL SPECIES: *C. pedata*, cherry-red, summer, 2 ft., Texas, var. *compacta*, crimson, white eye.

PERENNIAL SPECIES: *C. involucrata*, crimson, summer, 6 in., N. America.

Callistemon (Bottle Brush Tree)—*Myrtaceae*. Greenhouse evergreen flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, loam, and silver sand. Position, in pots, or in well-drained beds or borders with ample growing space. Pot or plant March or April. Prune shoots slightly after flowering. Water freely April to Sept., moderately afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By cuttings of firm shoots, 3 in. long, inserted in sandy peat under bell-glass, in temp. 55° to 65° during summer, or by seeds, which is a slow method of obtaining large flowering plants.

SPECIES CULTIVATED: *C. citrinus* (syn. *C. lanceolatus*), crimson, June, 8 to 10 ft., Australia; *salignus*, yellow, June, 6 ft., Australia, and vars. *albus*, white, *floribundus* and *viridiflorus*; *speciosus* (syn. *Metrosideros speciosus*), crimson, spring, 8 to 10 ft., Australia.

Callistephus (China Aster)—*Compositae*. Half-hardy annuals. First introduced early eighteenth century.

CULTURE: Soil, rich, liberally manured. Position, open, sunny, well drained. Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 50° to 60° in March, transplant seedlings in April 2 in. apart in shallow boxes or in bed of light soil in cold frame, plant out 6 to 12 in. apart in outdoor beds in May; or sow seeds same depth and soil in cold frame, or in pots in window in April and plant outdoors in May. Apply weak liquid manure twice a week during July and Aug.

POT CULTURE: Sow seeds as advised above. Transplant three seedlings into a 3 in. pot in April, into 5 in. in May, and 6 in. in June. Compost, four parts loam, one part leaf-mould or peat, with a small addition of dried cow manure and sand. Water freely, and apply liquid manure once a week when flower buds are formed. Thin out latter to three on each plant. Plants may be lifted from open ground in Aug. and placed in pots to flower if desired.

SPECIES CULTIVATED: *C. chinensis*, various colours, summer, 6 in. to 2 ft., China. Numerous types and refined strains are in commerce, and dwarf, late-flowering varieties are also available.

Callitriche (Water Starwort)—*Callitrichaceae*. Good oxygenating aquatics for ponds and aquariums.

CULTURE: Soil at base of pond, or aquarium compost. Plant, any time spring or summer.

PROPAGATION: By cuttings inserted in aquariums or in pans dropped in pond, or by weighting bunches with lead or stone and lowering these gently into water.

SPECIES CULTIVATED: *C. autumnalis*, entirely submerged, active during winter months, Europe incl. Britain; *verna*, upper leaves floating, pale green, cosmopolitan.

Calopsis—*Araceae*. Stove herbaceous perennial.

CULTURE: Compost, loam, leaf-mould and sand.

PROPAGATION: By division.

SPECIES CULTIVATED: *C. Volkensii*, spathe white, spadix yellow, July to Nov., 2 to 4 in., E. Trop. Africa.

Calluna—*Ericaceae*. Hardy evergreen flowering shrubs.

CULTURE: Soil, dry to moderately moist lime-free, preferably with peat. Position, in clumps on rockery or margins of shrubberies.

PROPAGATION: By division in Oct. or April; cuttings in August in sand and peat under bell-glass.

SPECIES CULTIVATED: *C. vulgaris*, 'Scotch Heather', 'Ling', purple, late summer, to 2 ft., Britain, Europe, and many horticultural varieties.

Calocarpum, see *Achras*.

Calocephalus—*Compositae*. Greenhouse sub-shrub with white cottony stems. Used mainly for carpet bedding.

CULTURE: Soil, ordinary. Position, sunny beds in summer only. Plant, May; lift and winter in cool greenhouse in Sept.

PROPAGATION: By cuttings inserted in cold frame in August.

SPECIES CULTIVATED: *C. Brownii* (syn. *Leucophyta Brownii*), trailing, Australia.

Calochortus (Butterfly Tulip; Star Tulip; Mariposa Lily)—*Liliaceae*. Half-hardy bulbous plants. First introduced early nineteenth century.

FRAME CULTURE: Prepare bed 12 in. deep with compost of equal parts loam, peat, leaf-mould, and sand. Plant bulbs 3 in. deep and 4 in. apart in Nov. Keep lights on in frosty weather; off night and day in fair weather. Water in dry weather. Lift and replant every three years.

POT CULTURE: Use same compost as advised for frame culture. Place a dozen bulbs 2 in. deep in a 5 in. pot in Nov. Cover pots with ashes in cold frame, and give no water. Remove pots from ashes in Jan. and place in cool greenhouse near glass. Water moderately till after flowering, then gradually withhold it. Repot annually in Nov.

OUTDOOR CULTURE: Plant bulbs in similar soil and manner to that advised for frames. Bed must be dry in winter, sunny, at foot of south wall.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pans of sandy soil in temp. 45° to 55° in March, transplanting seedlings following year into small pots and treating similarly to old bulbs; offsets planted like bulbs in Nov.

SPECIES CULTIVATED: *C. albus*, white, July, 1 ft., California; *amabilis*, yellow, July, 1 ft., California; *caeruleus*, lilac-blue, July, 6 in., California; *clavatus*, yellow, July, 2½ ft., California; *Gunnisonii*, white, July, 2 ft., W. America; *Howellii*, white, July, 18 in., Oregon; *Kennedyi*, orange-red, July, 2½ ft., California; *luteus*, yellow, July, 1 ft., California; *macrocarpus*, pale lavender and green, July, 1½ ft., California; *Maweanus*, purple and white, June to July, 6 to 10 in., San Francisco; *monophyllus* (syn. *C. Bentharii*), yellow, July, 8 in., California; *Nuttallii*, white, June, 6 in., California; *Plummerae*, soft lavender, July, 2 ft., California; *Purdyi*, white, July, 1 ft., Washington; *splendens*, lilac, July, 1 ft., California; *uniflorus* (syn. *C. lilacinus*), lilac, July, 9 in., California; *venustus*, white, July, 18 in., California. A number of varieties will be found in specialists' lists.

Calodendrum—*Rutaceae*. Greenhouse flowering evergreen shrub. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Position, pots or tubs, sunny. Pot and prune, March. Water moderately Sept. to March, freely afterwards. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By cuttings of shoots 3 in. long inserted in sandy soil under bell-glass in temp. 60° in June or July.

SPECIES CULTIVATED: *C. capense*, 'Cape Chestnut', pink, summer, 10 ft., S. Africa.

Calonyction (Moonflower)—*Convolvulaceae*. Stove or greenhouse annual climber. First introduced mid-eighteenth century. Formerly included in *Ipomoea*.

CULTURE: Compost, equal parts fibrous loam, leaf-mould, decayed manure and silver sand. Position, pots in warm greenhouse, shoots supported on twiggy stakes or trellis. Plant or pot, March or April. Temp., March to Sept. 65° to 70°. Water freely when established in final pots.

PROPAGATION: By seeds $\frac{1}{8}$ in. deep in pots in temp. 65° to 70° in March. Repot seedlings as required until they occupy 6 in. or 7 in. pots.

SPECIES CULTIVATED: *C. aculeatum* (syn. *Ipomoea Bona-Nox*), 'Good-night', night flowering, white, summer, 5 to 10 ft., Trop. America.

Calophaca—*Leguminosae*. Hardy, prostrate, deciduous flowering shrub. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, open shrubbery, full sun. Plant, Oct. to Feb.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in Nov. or March; by grafting on common laburnum in March.

SPECIES CULTIVATED: *C. wolgarica*, yellow, June, 3 ft., S. Russia.

Calopogon—*Orchidaceae*. A deciduous terrestrial genus of hardy, or nearly hardy, tuberous orchids. Flowers to 1 in. across, labellums bear a tuft of yellow hair; leaves grass-like. First introduced late eighteenth century.

CULTURE: Soil, peaty, mixed with fibrous loam, leaf-mould and sand. Position, moist sheltered rockery, not exposed to full sunshine. Plant, March or April. May also be grown in equal parts peat and loam in pots in cold frame or greenhouse.

PROPAGATION: By offsets treated as old plants.

SPECIES CULTIVATED: *C. pulchellus*, purple, July, 18 in., N. America.

Calostemma—*Amaryllidaceae*. Greenhouse flowering bulbous perennials. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Pot, Aug. Position, sunny greenhouse. Water freely March to July, moderately July to Sept., very little afterwards. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By offsets at potting time.

SPECIES CULTIVATED: *C. album*, white, May, 1 ft., N. Australia; *luteum*, yellow, Nov., 1 ft., Australia; *purpureum*, purple, Nov., 1 ft., Australia, var. *carneum*, pale purple.

Caltha (Kingcup, Water Cowslip)—*Ranunculaceae*. Hardy perennials.

CULTURE: Soil, rich. Position, damp borders, or banks of ponds, streams or lakes. Plant, Oct. or March.

PROPAGATION: By division of roots in March onwards if soil is wet.

SPECIES CULTIVATED: *C. leptosepala*, white, May, 1 ft., N.W. America; *palustris*, 'Marsh Marigold', 'Water Cowslip', 'Kingcup', yellow, April, 1 ft., Britain, and vars. *alba*, *monstroso-plena*; *polypetala*, yellow, 2 to 3 ft., Asia Minor.

Calvary Clover, see *Medicago Echinus*.

Calycanthus—*Calycanthaceae*. Hardy deciduous flowering shrubs.

CULTURE: Ordinary soil, not heavy, with some peat added, full sun. Plant, Oct. to March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in cold frame, March; by layers of shoots in July and Aug.

SPECIES CULTIVATED: *C. floridus*, 'Carolina Allspice', brownish purple, fragrant, June, 6 ft., S. United States; *fertilis* (syn. *C. glaucus*), brownish purple,

May, 6 ft., United States; *occidentalis* (syn. *C. macrophyllus*), red, fragrant, Aug., 9 ft., California.

Calypso—*Orchidaceae*. A monotypic, hardy, bulbous terrestrial orchid with solitary flowers terminating a stem up to 8 in. high, leaf solitary. The bulbs are entirely underground. First introduced early nineteenth century.

CULTURE: Compost, two parts leaf-mould, one part fibrous peat and coarse sand. Position, shady margins of rockwork or bog. Plant, Oct. or March. A mulch of leaves is advisable in winter, as severe frost may affect the roots.

PROPAGATION: By offsets treated as old plants at planting time.

SPECIES CULTIVATED: *C. bulbosa* (syns. *C. borealis*, *C. occidentalis*), rose-purple, lip curious, somewhat pouch-like with a tuft of golden hair in the throat, Jan., 1 ft., N. Temp. Zone.

Calystegia (Bindweed)—*Convolvulaceae*. Hardy, herbaceous trailing and climbing perennials sometimes included in the genus *Convolvulus*. Some species, such as *C. sepium* and *C. sylvestris* are bad weeds and should be used with care in the garden.

CULTURE: Soil, ordinary. Position, sunny border where fleshy roots can be confined and prevented from spreading over the garden. Plant, Oct. or March.

PROPAGATION: By seed in moderate heat in March or outdoors in April; division of roots in Oct. or March.

SPECIES CULTIVATED: *C. pubescens* (syn. *Convolvulus japonicus*), rose, summer, 6 ft., China, Japan; *sepium*, rose or white, July, 6 ft., Europe, Asia, N. America; *sylvestris*, white, July, 6 ft., Europe; *Soldanella*, pink, June, stems prostrate, Temp. Zone, incl. Britain; *tugorium*, white, summer, 6 ft., New Zealand, Juan Fernandez, Chile.

Camarotis—*Orchidaceae*. An epiphytic genus near *Sarcochilus*. Flowers small. The plants require supports.

CULTURE: Compost as for *Vandas*. Winter temp. 65° with moisture, no decided rest.

PROPAGATION: As for *Aerides*, in spring or early summer.

SPECIES CULTIVATED: *C. obtusa*, whitish, flushed rose, lip thickened, contracted apically, summer, Burma; *purpurea*, rose-purple lip dilated apically, funnel-like, summer, Burma.

Camassia (Quamash)—*Liliaceae*. Hardy bulbous plants. First introduced early nineteenth century.

CULTURE: Soil, ordinary loam. Position, beds or borders. Plant bulbs 4 in. deep and 4 in. apart in Oct. or Feb. Top-dress annually with leaf-mould or decayed manure. Lift and replant every four years.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in sunny position outdoors in March or $\frac{1}{8}$ in. deep in boxes of light soil in temp. 55° in Nov.; by offset bulbs in Oct. or Feb.

SPECIES CULTIVATED: *C. Cusickii*, pale blue, June, 3 ft., Oregon; *Leichtlinii*, white, June, 3 ft., E.N. America, var. *Suksdorfii*, blue-violet; *Quamash* (syn. *C. esculenta* Lindley), blue-violet to white, June, 3 ft., E.N. America; *scilloides* (syn. *C. esculenta* Robinson, *C. Fraseri*, *C. hyacinthina*), blue-violet to white, June, 2 ft., E.N. America.

Camellia—*Theaceae* (or *Ternstroemiaceae*). Half-hardy and hardy evergreen shrubs much better suited to outdoor cultivation than has previously been supposed, particularly *C. japonica* and its vars. First introduced early eighteenth century.

CULTURE: Easily grown in lime-free soil with some shelter from wind. Excellent for shady places and for walls with north aspect.

PROPAGATION: By seed in early spring; late summer cuttings in sandy peat in close frame.

SPECIES CULTIVATED: *C. japonica*, 'Common Camellia', for generations known as a greenhouse plant but now generally cultivated outdoors, eventually makes

a small tree to 30 ft., China, Japan, numerous named varieties in white, pink to scarlet, single and double; *maliflora*, small-flowered, double pink, spring, 6 ft., China; *reticulata*, half-hardy for walls in south, 4 in., delicate red flowers, China; *saluensis*, hardy in south, for walls inland, soft pink, May onwards, China; *Sasanqua*, white, Feb., 6 ft., China; *Williamsii*, pale pink, large, hybrid.

Campanula (Bellflower)—*Campanulaceae*. Hardy annuals, biennials, and perennials.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary rich. Position, trailing species on sunny rockeries; tall species beds and borders, sunny or shady. Plant, Oct. to April.

POT CULTURE: Compost, equal parts leaf-mould, loam and sand. Trailing kinds grow in small pots in hanging baskets. Repot them in March. Water moderately in winter, freely other times. Tall kinds grow singly in 7 in. pots or three in a 10 in. pot. Sow seeds of these in cold frame in Aug.; transplant seedlings singly in 3 in. pots in Oct., into 5 in. in April, 7 in. in May. Water moderately in winter, freely in summer.

CULTURE OF ANNUAL SPECIES: Sow seeds in gentle heat in March, transplant seedlings into boxes, harden off in cold frame in May and plant out in sunny borders early in June.

CULTURE OF CANTERBURY BELL: Sow seeds outdoors in April, May or June. Transplant seedlings when 1 in. high, 6 in. apart in nursery bed, and plant out in borders in Oct. to flower following year.

CULTURE OF BIENNIAL SPECIES: Sow seeds in pans or boxes in cool greenhouse or frame in Feb. or March. Prick out into frame when large enough to handle and plant in flowering positions in May or June.

CULTURE OF RAMPION: Sow seeds in shallow drills 6 in. apart in shady border of rich soil in May. Thin seedlings to 4 in. apart. Lift and store roots in frost-proof place in Nov. Uses: Young roots and leaves for winter salads; large roots cook and eat like parsnips.

PROPAGATION: Annuals, by seed. Perennials by seeds sown $\frac{1}{16}$ in. deep in sandy soil in temp. 55° in March or Aug.; division of roots in Oct. or April.

ANNUAL SPECIES: *C. drabifolia*, blue, July, 3 in., Greece; *macrostyla* (syn. *Sicyocodon macrostylus*), purple or mauve, July, 18 to 24 in., Asia Minor; *ramosissima* (syn. *C. Loreyi*), purple-blue, June to July, 1 ft. to 1½ ft., Italy.

BIENNIAL SPECIES: *C. longistyla*, blue-purple, summer, 1½ to 2½ ft., Caucasus; *Medium*, 'Canterbury Bell', blue, July, 3 ft., S. Europe, and several white, rose and purple single and double vars.; *patula*, pale violet, June, 2 to 3 ft., Europe (Britain); *Rapunculus*, 'Rampion', blue or white, July, 2 to 3 ft., Europe (Britain); *speciosa*, violet, summer, 1 to 1½ ft., S. Europe; *spicata*, purple, summer, 1 ft., Alps; *thyrsoides*, straw-yellow, July, 1 to 1½ ft., Alps.

PERENNIAL SPECIES: *C. abietina*, blue, July, 1 ft., Europe; *alliariifolia*, cream, June, 24 in., Caucasus; *Allionii* (syn. *C. alpestris*), blue, June, 3 in., Europe; *alpina*, blue, June, 4 in., Europe; *ardonensis*, purple, 4 in., July, Caucasus; *arvatica*, deep blue, 2 in., June, Spain, and var. *alba*; *Aucheri*, Tyrian purple, 4 in., June, Asia Minor; *barbata*, blue, June, 9 in., Europe; *bellidifolia*, violet-purple, summer, 4 in., Caucasus; *bononiensis*, blue, June to July, 2½ ft., Europe; *caespitosa*, blue, summer, 3 in., Europe, and var. *alba*; *carpatica*, blue, summer, 12 in., E. Europe, and innumerable garden vars. and hybrids; *cashmiriana*, pale blue, 3 in., summer, Himalaya; *cenisia*, blue, prostrate, May, Alps; *cochleariifolia* (syn. *C. pusilla*), blue, July, 4 in., Alps, and numerous vars.; *collina*, blue, July, 1 ft., Caucasus; *Elatines*, purple, summer, 4 in., Piedmont, and many vars. including *fenestrellata*, violet blue, and *garganica*, light violet blue, spreading; *excisa*, blue, May, 6 in., Alps, dislikes lime; *Formanekiana*, blue or white, 12 in., July, Greece; *fragilis*, lilac, Aug., 6 in., Italy; *glomerata*, blue, summer, 12 to 18 in., Europe incl. Britain, and several vars., including *acaulis*, 4 in.; *Herminii*, pale blue, 6 in., summer, Spain; *imeretina*, purple, 9 in., July, Caucasus; *incurva*, pale blue or white, 18 in., summer, Greece; *isophylla*, lilac-blue, 4 to 6 in., July, Italy, and

vars. *alba*, white, *Mayi*, mauve; *kewensis*, blue, 4 in., July, hybrid; *Kolenatiana*, purple-blue, 9 to 12 in., late summer, Caucasus; *laciniata*, pale blue, 18 in., July, Crete; *lactiflora*, blue or white, 3 ft., July, Caucasus; *lanata* (syn. *C. velutina*), yellow and peach pink, 3 ft., summer, S. Europe; *lasiocarpa*, blue, 2 in., July, Japan and U.S.A.; *latifolia*, blue, July, 4 to 5 ft., Britain, and numerous garden vars.; *macrorrhiza*, blue, 6 to 9 in., summer, Europe; *malacitana*, blue, 2 in., June to July, Spain; *michauxioides*, blue, 4 to 5 in., summer, Asia Minor; *mirabilis*, pale blue, 9 in., summer, Caucasus; *Morettiana*, blue, 2 to 3 in., July, Italy; *Orphanidea*, grey-blue, 4 to 6 in., July, Macedonia; *persicifolia*, blue, June, 3 ft., Europe, and many garden vars.; *phycitocalyx* (syn. *C. amabilis*), purple, summer, 1 ft., Armenia; *pilosa*, blue, 6 in., summer, Asia; *Piperi*, dark blue, 2 in., N.W. America; *Portenschlagiana* (syn. *C. muralis*), deep blue, June to Aug., 6 in., Macedonia; *Poscharskyana*, grey-blue, 12 in., June, Serbia; *pulla*, deep blue, June, 4 in., hybrid; *pulloides*, deep blue, 4 in., June, hybrid; *punctata* (syn. *C. nobilis*), cream, spotted red, June to July, 1 ft., Asia; *pyramidalis*, 'Chimney Bell-flower', blue, July, 4 to 5 ft., Dalmatia, and var. *alba*, white; *Raddeana*, violet, July, 12 in., Caucasus; *Raineri*, blue, June, 3 in., Alps, and var. *alba*; *rapunculoides*, deep blue, June, 3 ft., Europe, Asia; *rhomboidalis*, blue or white, June, 1 to 2 ft., Europe; *rotundifolia*, 'Harebell', blue, summer, 6 to 9 in., Britain, and many vars.; *sarmatica*, pale blue, July, 1 ft., Caucasus; *saxatilis*, blue, 9 to 12 in., June to July, E. Europe; *Saxifraga*, deep blue, 6 to 9 in., June, Caucasus; *Scouleri*, blue, 12 in., June, N. America; *Spruneriana*, blue, prostrate, June to July, Greece; *Stansfieldii*, soft blue, 6 in., June, hybrid; *Stevenii*, purple, May to June, 6 in., Europe, Asia; *Tommasiniana*, blue, July, 6 in., Italy; *Trachelium*, blue, July, 3 ft., Europe and vars. *alba*, white, *alba plena*, double white, and *flore pleno*, double blue; *tridentata*, violet, 4 in., summer, Armenia; *valdensis*, violet, grey leaves, 9 in., Europe; *Vidalii* (syn. *Azorina Vidalii*), white, 2 to 6 ft., summer, Azores, shrubby greenhouse perennial; *Wockii*, pale blue, summer, 3 in., hybrid; *Zoysii* (syn. *Favratia Zoysii*), pale blue, summer, 2 to 3 in., E. Europe.

Campernelle, see *Narcissus odoratus*.

Camphor Tree, see *Cinnamomea Camphora*.

Campion, see *Lychnis*.

Campsis (Trumpet Creeper)—*Bignoniaceae*. Greenhouse and hardy deciduous climbing plants with orange or scarlet trumpet-shaped flowers. For many years known in gardens as either *Bignonia* or *Tecoma*, now botanically classified as *Campsis*. First introduced early eighteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part leaf-mould or peat, and silver sand. Position, large well-drained pots or beds in light sunny greenhouse with shoots trained up roof. Pot or plant, Feb. or March, good drainage absolutely essential. Water copiously April to Oct., slightly at other times. Temp., Oct. to March 45° to 55°, March to Oct. 55° to 65°. Prune severely by cutting all young shoots to within two buds of their base in February; permanent main stems must be trained up like a vine rod.

CULTURE OF HARDY SPECIES: Soil, good rich loam with compost or well-decayed manure added. Position, well-drained border against south wall. Plant, Sept. to March. Prune as for greenhouse species in March, support necessary for main stem.

PROPAGATION: By cuttings of firm young shoots 3 in. long in well-drained pots of sandy soil in temp. 65° to 70° in April.

GREENHOUSE SPECIES CULTIVATED: *C. grandiflora* (syn. *Bignonia* or *Tecoma chinensis*), red and yellow, summer, China, var. *Thunbergii*, orange.

HARDY SPECIES CULTIVATED: *C. radicans*, orange-red, summer, N. America, and vars. *flava*, orange-yellow, *praecox*, scarlet, June, *speciosa*, bushy growth; *Tagliabuana*, scarlet, similar to *C. grandiflora* but hardier, hybrid.

Canada Tea, see *Gaultheria procumbens*.

Canadian Wild Rice, see *Zizania*.

Canarina—*Campanulaceae*. Greenhouse herbaceous perennials. First introduced late seventeenth century.

CULTURE: Compost, equal parts loam, leaf-mould, decayed manure and silver sand. Position, pots or hanging basket. Pot, Feb.; good drainage very essential. Water liberally March to Aug., moderately Aug. to Nov., very little afterwards. Temp., Sept. to Feb. 45° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By cuttings of young shoots inserted in sandy soil in temp. 65° in March or April; division of roots in Feb.

SPECIES CULTIVATED: *C. canariensis*, 'Canary Island Bellflower', orange, Jan. to March, 4 ft., Canary Islands; *Eminii*, orange striped red, 4 to 5 ft. long pendent shoots, E. Africa.

Canary Creeper, see *Tropaeolum peregrinum*; **-Grass**, see *Phalaris canariensis*; **-Island Bellflower**, see *Canarina canariensis*.

Candle Plant, see *Kleinia articulata*.

Candy Mustard, see *Aethionema saxatile*; **-tuft**, see *Iberis*.

Canistrum—*Bromeliaceae*. Stove evergreen flowering and ornamental plants. Flower spikes surrounded by red bracts. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts of fibrous loam, rough peat, leaf-mould and silver sand. Position, well-drained pots in light, moist part of stove. Pot, Feb. or March. Water moderately in winter, freely at other times. Temp., March to Sept. 70° to 80°, Sept. to March 65° to 70°.

PROPAGATION: By large-sized offshoots inserted singly in small pots of sandy peat, in temp. of 85°, Feb. or April.

SPECIES CULTIVATED: *C. amazonicum*, greenish white, June, 1 to 1½ ft., Brazil; *aurantiacum*, orange-yellow, June to Sept., 2 ft., Brazil; *roseum*, rose, July, 18 in., Brazil; *viride*, green, 1 to 1½ ft., Brazil. See also *Aechmea*. Some of the above are occasionally listed as *Nidularium*.

Canna—*Cannaceae*. Stove herbaceous plants. First introduced mid-sixteenth century. The tubers of *C. edulis* are edible.

INDOOR CULTURE: Compost, equal parts loam, decayed manure, leaf-mould and sand. Position, pots in sunny greenhouse. Pot, March. Water freely March to Oct., very little afterwards. Temp., Sept. to March 40° to 50°, March to Sept. 65° to 85°. Apply weak liquid manure twice a week to plants in healthy growth.

OUTDOOR CULTURE: Place roots in pots in March in temp. 55° to 60°. Remove pots into temp. 55° end of April and plant outdoors early in June. Lift roots in Sept., place them in boxes filled with ordinary soil, keep latter nearly dry, and store in frost-proof position till potting time.

PROPAGATION: By seeds steeped for 24 hours in tepid water, then sown ½ in. deep in light soil in temp. 85° in Feb.; division of roots at potting time. It will facilitate germination if a slight notch be filed in the seed before sowing.

SPECIES CULTIVATED: *C. edulis*, bright red, summer, 8 to 10 ft., W. Indies and S. America; *flaccida*, yellow, summer, 4 to 5 ft., S. Carolina; *glauca*, yellow, summer, 5 to 6 ft., Mexico, W. Indies and S. America; *indica*, 'Indian Shot', yellow and red, summer, 4 ft., W. Indies; *iridiflora*, rose, summer, 8 to 10 ft., Peru; *Warszewiczii*, scarlet, tinged blue, summer, 3 to 5 ft., Costa Rica and S. America. See trade lists for names of varieties belonging to the hybrid groups *C. generatis* and *C. orchoides*.

Cannabis—*Moraceae*. Hardy annuals.

CULTURE: Soil, ordinary. Position, sunny borders.

PROPAGATION: By seeds sown ½ in. deep outdoors, where plants are to grow, in April, or in temp. 55° in March, transplanting seedlings in June.

SPECIES CULTIVATED: *C. sativa* (syn. *C. gigantea*), green, June, 4 to 10 ft., India.

Canterbury Bell, see *Campanula Medium*.

Cantua—*Polemoniaceae*. Greenhouse evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts turfy loam, one part leaf-mould and sand. Position, pots, sunny greenhouse. Pot, March. Water moderately Sept. to March, freely March to Sept. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By cuttings of shoots inserted in silver sand under bell-glasses in temp. 50° to 55°, May to Aug.

SPECIES CULTIVATED: *C. bicolor*, yellow and red, May, 4 ft., Bolivia; *buxifolia*, 'Peruvian Magic Tree', rose, May, 5 ft., Peru; *pyrifolia*, creamy-white, March, 3 ft., S. America.

Cape Blue Waterlily, see *Nymphaea capensis*; **-Chestnut**, see *Calodendron capensis*; **-Cowslip**, see *Lachenalia*; **-Crocus**, see *Gethyllis spiralis*; **-Forget-me-not**, see *Anchusa capensis*; **-Gooseberry**, see *Physalis peruviana*; **-Honey-flower**, see *Melianthus major*; **-Honeysuckle**, see *Tecomaria capensis*; **-Jasmine**, see *Gardenia jasminoides*; **-Leadwort**, see *Plumbago capensis*; **-Lily**, see *Crinum longifolium*; **-Pondweed**, see *Aponogeton distachyus*; **-Primrose**, see *Streptocarpus*; **-Silver Tree**, see *Leucadendron argenteum*; **-Treasure Flower**, see *Gazania pavonia*.

Caper Bush, see *Capparis spinosa*; **-Spurge**, see *Euphorbia Lathyris*.

Capparis—*Capparidaceae*. Slightly tender evergreen shrub. The flower buds of *C. spinosa* are pickled and sold as capers. First introduced late sixteenth century.

CULTURE: Compost, two parts turfy loam, one part leaf-mould and sand. Position, pots in sunny greenhouse. Pot, March; good drainage essential. Plant outdoors Sept. to Nov. Water moderately in pots Sept. to March, freely afterwards. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°. May be grown outdoors in sheltered position in S. of England.

PROPAGATION: By cuttings of firm shoots in sand under bell-glasses in temp. 65° to 75°, July or Aug.

SPECIES CULTIVATED: *C. cynophallophora*, white, fragrant, 8 ft., Trop. America; *spinosa*, 'Caper Bush', white, June, 3 ft., S. Europe, and its var. *rupestris*.

Capsicum (Red Peppers)—*Solanaceae*. Greenhouse shrubby plants usually grown as annuals. Variable many-seeded fleshy fruits differing in size, shape, colour and pungency under cultivation. Paprika is made from long, thick, bright red fruits and Cayenne from long slender form. First introduced mid-sixteenth century.

CULTURE: Soil, light rich. Position, pots in sunny greenhouse, against south wall outdoors in summer.

PROPAGATION: By seeds in temp. 80° in Feb. Transplant seedlings singly into 3 in. pots in March and into 6 in. pots in May. Water freely. Gather fruit when full colour is attained.

SPECIES CULTIVATED: *C. frutescens* (syn. *C. annum*), 'Bird Pepper', red fruits, Tropics, and vars. *cerasiforme*, 'Cherry Pepper', *conoides*, 'Cone Pepper', *fasciculatum*, 'Red Cluster Pepper', *grossum*, 'Bell or Sweet Pepper', *longum*, 'Long Pepper', many types including Chilli, Cayenne, Paprika, etc.

Caragana—*Leguminosae*. Hardy flowering, deciduous, easily grown trees and shrubs. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary, succeeding in poor dry areas. Position, full sun. Plant, Oct. to March.

PROPAGATION: By seeds sown 2 in. deep in ordinary soil outdoors in Nov. or March; cuttings of roots 3 in. deep outdoors in Oct.; layers of strong shoots in Sept.; grafting choice species on *C. arborescens* in March.

SPECIES CULTIVATED: *C. aborescens*, yellow, May, 15 ft., Siberia, and vars. *Lorbergii*, *nana*, *pendula*; *frutex*, yellow, April, 3 ft., Russia and Japan; *Franchetiana*, large flowers shaded maroon, 9 ft., S.W. China; *Gerardiana*, pale yellow or white, 2 to 4 ft., N.W. Himalaya; *Maximowicziana*, weeping habit, to 4 ft., W.

China; *microphylla*, yellow, May to June, 6 to 10 ft., N. Cent. Asia; *pygmaea*, yellow, May to June, 3 to 4 ft., Caucasus to Tibet; *sinica* (syn. *C. Chamlagu*), reddish yellow, May to June, 3 to 4 ft., N. China; *spinosa*, yellow, May, 4 to 6 ft., Siberia.

Caraway, see *Carum Carvi*.

Cardamine (Bitter Cress)—*Cruciferae*. Hardy herbaceous and tender aquatic plants. *C. lyrata* is a very pretty submerged aquatic not unlike Creeping Jenny.

CULTURE: Soil, ordinary. Position, moist, shady border or in the bog garden. Plant, Oct. March or April.

PROPAGATION: By seeds sown outdoors in April; division of roots in Oct.

SPECIES CULTIVATED: *C. asarifolia*, white, May, 1 ft., Italy; *cordifolia* (syn. *C. macrophylla*), pale purple, June, 1 ft., E. Asia; *lyrata*, aquatic, China, Japan; *pratense*, 'Lady-Smock', 'Cuckoo Flower', white to rose, May, 1 to 2 ft., Europe (Br.), Asia, etc.; *trifolia*, white, March to April, 3 to 4 in., S. Europe.

Cardinal, Flower, see *Lobelia cardinalis*; **-Monkey Flower**, see *Mimulus cardinalis*.

Cardiocrinum (Giant Lily)—*Liliaceae*. Hardy bulbous-rooted perennials formerly included in the genus *Lilium*. First introduced mid-nineteenth century.

CULTURE: Moist, well-drained loam with leaf-mould, peat and sand. Position, woodlands or other partially shaded places. Plant, Oct. with bulbs barely covered. Bulbs die after flowering but may leave offsets behind to flower again.

PROPAGATION: By seeds sown in sandy peat and loam in autumn. Seedlings take about seven years to flower. By removal of offsets in Oct.

SPECIES CULTIVATED: *C. cathayanum*, greenish-white, July, Aug., 1 to 4 ft., China; *cordatum*, creamy-white, July to Aug., 4 to 6 ft., Japan; *giganteum* (syn. *Lilium giganteum*), white, July to Aug., 6 to 12 ft., Himalaya.

Cardoon see *Cynara Cardunculus*.

Carex (Blue Grass; Sedge)—*Cyperaceae*. Hardy herbaceous perennial grasses.

CULTURE: Soil, ordinary. Position, margins of ponds. Plant, March. The variegated kinds may be grown in pots in ordinary good soil in cool greenhouses or in rooms.

PROPAGATION: By seeds sown where plants are to grow in March; division of roots in March.

SPECIES CULTIVATED: *C. acuta*, 2 to 3 ft., Europe; *baccans*, purple fruits, 4 ft., Trop. Asia; *depauperata*, 1 ft., Europe; *Pseudo-cyperus*, 'Bastard Cyperus', 3 ft., Temp. Zone; *pendula*, brown inflorescence, summer, 5 to 6 ft., Britain; *riparia*, yellow foliage, 18 in., Britain; *tristachya*, leaves striped with white, 1 ft., Japan; *Vilmorinii* (syn. *C. comans*), 2 to 3 ft., New Zealand.

Carica—*Caricaceae*. Stove evergreen tree. Grown in Tropics for its edible fruits. First introduced late seventeenth century.

CULTURE: Rich loam. Position, large pots or borders in warm greenhouse. Pot or plant, March. Water freely during growing season; sparingly at other times. Temp., March to Oct. 65° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By cuttings of ripened growths in sandy soil under bell-glass in temp. 80°; cuttings; grafts.

SPECIES CULTIVATED: *C. Papaya*, 'Papaya', 'Pawpaw', yellow, July, fruits yellow or orange, 3 to 30 in. long, 20 to 25 ft., Trop. America.

Carlina (Carlina Thistle)—*Compositae*. Hardy perennials. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, open dryish border. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in April where plants are required to grow.

SPECIES CULTIVATED: *C. acanthifolia*, white, June, 18 in., S. Europe; *acaulis* (syn. *Cirsium acaule* or *Cirsium acaulis*), white, June, 9 in., Europe.

Carline Thistle, see *Carlina acanthifolia*.

Carludovica—*Cyclanthaceae*. Stove ornamental-leaved perennials with green, divided, palm-like leaves. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part sandy loam. Position, moist, shady. Pot, March. Water moderately Nov. to March, freely afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By division of plant at potting time.

SPECIES CULTIVATED: *C. atrovirens*, 2 to 4 ft., Northern S. America; *gracilis* (syn. *C. Plumieri*), 2 ft., W. Indies; *insignis*, 3 to 6 ft., Peru; *palmata*, stemless, the leaves furnish fibre from which Panama hats are made, Peru; *rotundifolia*, 2 to 4 ft., Costa Rica.

Carmichaelia—*Leguminosae*. Greenhouse or hardy deciduous shrubs. First introduced early nineteenth century.

CULTURE: Soil, ordinary with a little sand, leaf-mould and peat. Position, sheltered borders or walls, or in borders in the cold greenhouse.

PROPAGATION: By cuttings of half-ripened side-growths inserted in sandy soil under a bell-glass in the cold greenhouse.

SPECIES CULTIVATED: *C. australis*, lilac, May to Aug., 2 to 4 ft., New Zealand; *Enysii*, violet, 1 ft., summer, New Zealand; *flagelliformis*, purplish lilac, June, 4 to 5 ft., New Zealand, and var. *corymbosa*; *grandiflora*, purple, 3 to 6 ft., June, New Zealand; *odorata*, 6 ft., rosy-lilac, June, New Zealand; *Williamsii*, greenish-yellow, 3 to 6 ft., New Zealand.

Carnation, see *Dianthus Caryophyllus*.

Carob see *Ceratonia siliqua*.

Carpenteria—*Saxifragaceae* (or *Hydrangeaceae*). Hardy to half-hardy evergreen flowering shrub. First introduced mid-nineteenth century.

CULTURE: Soil, light loamy. Position, in sheltered shrubberies in the south, but requiring wall protection in colder districts.

PROPAGATION: By cuttings of young shoots inserted in cold frame in August, or from seed sown in March.

SPECIES CULTIVATED: *C. californica*, 'Californian Mock Orange', white, 2 in. fragrant anemone-like flowers, 6 ft., California.

Carpenter's Leaf, see *Galax aphylla*.

Carpinus—*Betulaceae*. Hardy deciduous trees frequently confused with beech, but having in our native species a rugged fluted trunk; that in the beech is smooth. Good for hedging, retaining old leaves until spring as in beech used for this purpose. Wood hard and used in manufacture of pianoforte keys and hammers.

CULTURE: Any ordinary soil including chalk. Plant Oct. to March. Use native *C. Betulus* for hedging, and plant 18 in. apart.

PROPAGATION. By seeds sown $\frac{1}{2}$ in. deep in autumn in fine soil out of doors. Transplant seedlings when 1 year old. 1 lb. contains 14,000 seeds.

SPECIES CULTIVATED: *C. Betulus*, 'Hornbeam', 50 to 80 ft., Europe, including Britain, with vars. *asplenifolia*, cut-leaved, *columnaris* and *pyramidalis*, excellent fastigate trees, and *pendula*; *caroliniana*, 'American Hornbeam', young growths attractive, 40 ft., America; *japonica*, sturdy pyramidal habit, 40 ft., Japan; *laxiflora*, 45 ft., Japan; *orientalis*, 20 ft., S.E. Europe; *polyneura*, graceful habit, 30 ft., W. China; *Turczaninowii* var. *ovalifolia*, similar, with tinted young growths, 25 ft., W. China.

Carpet Plant, see *Ionopsidium acaule*.

Carpobrotus—*Aizoaceae*. Half-hardy succulent plants. Formerly included in *Mesembryanthemum*.

CULTURE: Soil, ordinary. Position, sunny well-drained borders in sheltered districts.

PROPAGATION: By seed; cuttings in temp. 55° to 65° in March to Sept.

SPECIES CULTIVATED: *C. acinaciformis* (syn. *Mesembryanthemum acinaciforme*), reddish, August, trailing, S. Africa; *edulis* (syn. *M. edule*), 'Hottentot Fig', yellow, July, S. Africa.

Carrierea—*Flacourtiaceae*. Deciduous tree with attractive foliage and flowers in terminal racemes or panicles.

CULTURE: Soil, well drained. Position, sheltered.

PROPAGATION: By seeds; cuttings of green wood; layers; root cuttings.

SPECIES CULTIVATED: *C. calycina*, creamy-white, to 30 ft., Cent. China.

Carrion Flower, see *Stapelia*.

Carrot, see *Daucus Carota* var. *sativa*.

Carthamus (Distaff Thistle)—*Compositae*. Hardy annuals. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, sunny border.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 55° in March, transplanting seedlings where they are to flower in May.

SPECIES CULTIVATED: *C. lanatus*, yellow, July, 2 ft.; *Oxyacantha*, yellow, July, 2 ft.; *tinctorius*, 'Safflower', orange, June, 3 ft. All natives of Europe.

Cartwheel Flower, see *Heracleum villosum*.

Carum—*Umbelliferae*. Hardy thick-rooted herbs. *C. Carvi* is grown for the seeds which are used as flavouring. Oil used in kummel.

CULTURE: Sow as soon as seed is ripe in autumn or in the following spring. Autumn-sown plants flower in the summer, spring-sown flower the following summer. Cut when seeds begin to ripen and spread in warm place to dry, then thrash and dry further. Roots also are edible.

SPECIES CULTIVATED: *C. Carvi*, 'Caraway', white, July, 2 ft., Europe.

Carya (Hickory)—*Juglandaceae*. Hardy deciduous trees. Full-grown trees bear edible nuts similar to walnuts. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, shrubberies, woods or as single specimens on lawns and in parks. Plant, Oct. to March. Prune, Nov., thin out unsightly branches only.

PROPAGATION: By seeds, place nuts in box of soil outdoors for winter and keep soil well moistened. In March pot singly in 6 in. pots and place on gentle bottom heat; when seedlings appear harden off gradually and plant in permanent quarters before roots become potbound.

SPECIES CULTIVATED: *C. glabra* (syn. *C. porcina*), 'Pignut', 80 to 90 ft., E. America; *Pecan*, 'Pecan', 100 to 170 ft., South U.S.A.; *tomentosa*, 'Mockernut', 50 to 60 ft., E. America.

Caryolopha, see *Pentaglottis*.

Caryopteris—*Verbenaceae*. Hardy and half-hardy shrubs sometimes called Blue Spiraea.

CULTURE: Any garden soil, full sun. Prune previous season's shoots annually in March to two buds.

PROPAGATION: September cuttings in frame.

SPECIES CULTIVATED: *C. clandonensis*, hardy, garden hybrid, rounded bush to 2 ft., bright violet blue flowers, August, Sept.; *incana* (syn. *C. Mastacanthus*), 'Bluebeard', 4 ft., China; *mongholica*, 3 ft., China.

Caryota—*Palmae*. Stove monocarpic palms. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and coarse sand. Position, pots, moist, shady. Pot, March. Water freely March to Nov., moderately afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 85°.

PROPAGATION: By seeds sown 1 in. deep in light soil in temp. 85° in March; suckers removed from roots, inserted in small pots, any time.

SPECIES CULTIVATED: *C. mitis*, 20 to 25 ft., Malaya; *Rumphiana*, 20 to 30 ft., Malaya, Australia; *urens*, 'Toddy Palm', 'Wine Palm', 30 to 40 ft., Trop. Asia.

Cashew Nut, see *Anacardium occidentale*.

Cassava, see *Manihot esculenta*.

Cassia (Senna)—*Leguminosae* (or *Caesalpinaceae*). Greenhouse evergreen shrubs and hardy perennials. The leaves of some species provide the medicinal senna. First introduced early eighteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part peat and sand. Position, pots in greenhouse, or well-drained border against south wall. Pot, March. Plant outdoors April. Water moderately Nov. to Feb., freely afterwards. Prune straggling shoots to within 2 in. of base in Dec. or Jan. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

CULTURE OF HARDY SPECIES: Soil, ordinary well drained. Position, sunny borders. Plant, March or April. Protect in winter with covering of leaves or ashes.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 75° in March; cuttings of previous year's shoots inserted in sandy soil under bell-glass in temp. 80° in March; herbaceous species by division in March.

GREENHOUSE SPECIES: *C. acutifolia*, 'Alexandrian Senna', shrubby, 3 to 4 ft., Upper Nile; *angustifolia*, 'Indian Senna', yellow, summer, 10 to 15 ft., Arabia; *corymbosa*, yellow, summer, 6 to 10 ft., Buenos Ayres; *Fistula*, 'Pudding Pipe Tree', pale yellow, 20 to 30 ft., India, of economic interest, being the source of the senna pods of commerce.

HARDY SPECIES: *C. marilandica*, yellow, Sept., 3 ft., N. America.

Cassia Bark Tree, see *Cinnamomum Cassia*.

Cassie, see *Acacia Farnesiana*.

Cassinia—*Compositae*. Hardy, evergreen, flowering and ornamental-leaved shrubs of heath-like appearance.

CULTURE: Soil, ordinary. Position, sunny, dryish borders. Useful maritime shrubs which grow well in chalk. Plant in autumn.

PROPAGATION: By cuttings of young shoots inserted in sandy soil in cold frame in summer.

SPECIES CULTIVATED: *C. fulvida*, 'Golden Bush', white, summer, 4 to 6 ft., leaves golden tinted, New Zealand; *leptophylla*, white, Aug. to Sept., 4 to 5 ft., New Zealand; *Vauvilliersii*, white, 2 to 6 ft., New Zealand.

Cassiope—*Ericaceae*. Hardy, evergreen flowering shrubs. Formerly known as *Andromeda*. First introduced late eighteenth century.

CULTURE: Soil, sandy peat. Position, moist, cool, north aspects.

PROPAGATION: Seeds, layers and cuttings.

SPECIES CULTIVATED: *C. fastigiata*, white, May, 9 to 12 in., Himalaya; *glandulifera*, cream-white, 12 in., May, U.S.A.; *hypnoides*, white, June, 2 in., Arctic; *lycopodioides*, white, prostrate, May, Asia; *Mertensiana*, white, 9 to 12 in., May to June, U.S.A.; *selaginoides*, white, 4 to 6 in., May to June, Asia; *Stelleriana* (syn. *Harrimanella Stelleriana*), white, prostrate, April to May, U.S.A.; *tetragona*, white, 9 in., May, Arctic Europe, America; *Wardii*, white, 9 to 12 in., May, Asia.

Castanea (Chestnut)—*Fagaceae*. Hardy deciduous trees. Bears edible nuts, which should be separated from the husks when latter fall in autumn, then be thoroughly dried in the sun or warm oven, and stored in air-tight jars or boxes in a cool, dry place. Young trees much grown as coppice wood for game shelter. Probably introduced to Britain by Romans.

CULTURE: Soil, deep, rich, dry and sandy. Position, open, sunny. Plant, Oct. to Feb. Transplant seedlings when a year old. Distance apart to plant, 25 ft. for avenues and 5 ft. apart for underwood. Useful Data: Timber most valuable in a young state; brittle when old. One bushel of seed will yield 3,000 plants. Number of seeds in a pound, 115. Weight of bushel of seed, 58 lb. Quantity of seeds to sow an acre, 600 lb. Timber reaches maturity at 50 years. Average life,

500 years. Uses: Rafters in churches, cabinet work, post and rail fencing, rustic work.

PROPAGATION: By seeds sown as soon as ripe in the open ground; choice varieties by grafting in spring on *C. sativa*.

SPECIES CULTIVATED: *C. crenata*, 20 to 30 ft., Japan; *dentata* (syn. *C. americana*), 50 to 100 ft., Eastern N. America; *mollissima*, 50 ft., China and Korea; *pumila*, 10 to 20 ft., Eastern N. America; *sativa*, 'Spanish Chestnut', 50 to 60 ft., S. Europe, N. Africa, etc.; *Seguinii*, small tree, to 20 ft., sweet nuts, China.

Castanopsis—*Fagaceae*. Hardy, evergreen, ornamental-leaved tree.

CULTURE: Soil, sandy or well-drained loam, peat and leaf-mould. Position, lawns or mixed shrubberies. Plant, Oct. to March.

PROPAGATION: As advised for Sweet Chestnut.

SPECIES CULTIVATED: *C. chrysophylla* (syn. *Castanea chrysophylla*), 'Golden-leaved Chestnut', 30 to 100 ft., Oregon and California.

Castilleja—*Scrophulariaceae*. Half-hardy perennial plants with showy bracts; very difficult to grow owing to their semi-parasitic nature.

CULTURE: Compost, two parts peat, one part of equal proportions of loam, leaf-mould and sand. Position, sunny sheltered borders. Plant in April. Protect in winter.

PROPAGATION: By seeds sown in temp. 55° to 65° in March, hardening off seedlings in cold frame.

SPECIES CULTIVATED: *C. acuminata*, 'Indian Paint-brush', scarlet, N. America; *coccinea*, yellow and scarlet, July, 1 ft.; *pallida*, light purple, 1 ft., N. America.

Castor Oil Plant, see *Ricinus communis*.

Catalpa—*Bignoniaceae*. Hardy, deciduous, flowering and ornamental-leaved trees. First introduced early eighteenth century.

CULTURE: Soil, ordinary, good. Position, sunny, sheltered lawns. Plant, Oct. to April.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil under bell-glass in temp. 55° to 65° in summer.

SPECIES CULTIVATED: *C. bignonioides*, 'Indian Bean', white, spotted purple and yellow, July, 25 to 50 ft., United States, and var. *aurea*, golden-leaved; *Bungei*, flowers like foxgloves, white, spotted purple, 30 ft., China; *Fargesii*, rosy pink, spotted purple, 30 to 50 ft., W. China, with its fine var. *Duclouxii* with large mauve-pink flowers; *ovata* (syn. *C. Kaempferi*), yellow, spotted red, July, 20 to 40 ft., Japan; *speciosa* (syn. *C. cordifolia*), white, June, 30 to 100 ft., Southern Central United States.

Catananche (Cupid's Dart)—*Compositae*. Hardy perennials and annuals. Flowers may be cut and dried for winter decoration; gather when fully developed. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, warm borders. Plant, April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 55° in March, transplanting seedlings outdoors in June; by root cuttings at any time.

SPECIES CULTIVATED: *C. caerulea*, 'Blue Cupidone', blue, 2 ft., July and Aug., S. Europe, and var. *bicolor*, white and blue; *lutea*, annual, yellow, June, 1 ft., S. Europe, and var. *major*, improved double form, July to Sept., 2 ft.

Catasetum—*Orchidaceae*. Over 100 species are known in this chiefly epiphytic genus. The flowers are among the most remarkable in the order as they are dioecious. The male flowers in many have a curious adaptation of the rostellum, which is developed into two slender horns; on touching one of these the pollen is ejected. Habit is very similar in all; stout ovoid pseudo-bulbs carrying and sheathed with plicate leaves. The spikes, generally simple, produced from the base or lower parts of the pseudo-bulbs. The male flowers, 6 to 30 are of curious shape, approaching contortion in some; the labellums generally saccate or helmet shape. The female flowers are more simple and consistent in shape, the lip more

cup-shaped. In both the lip is fleshy and usually the largest of the segments. Some forms are deciduous, others are nearly so.

CULTURE: Compost as advised for Cattleyas. Baskets or pans are preferable to pots and should be suspended near the glass, especially in winter and late autumn, when exposure to full light is beneficial. Winter temp. should be 60° to 70°, when watering, if any, should be very occasional. Summer temp. 70° and upwards. Water should never be allowed to lodge on the leaves. The many garden hybrids require similar temperatures to the species, but until developed into large plants seldom have a definite resting period. Winter growths are often present and if this is the case a higher temp. and a 'growing' atmosphere are required. When dormant, if only for a short period, give a corresponding rest.

PROPAGATION: By division of plants, each division with not less than four bulbs and a growing point in spring, when repotting should be effected if necessary.

SPECIES CULTIVATED: A selection—*C. barbatum*, variable, green, lip often whitish with fleshy filaments on the margin, various, Brazil, Demerara; *callosum*, brown-red, lip large flattish, shaded yellow, autumn, Venezuela; *Cliftonii*, usually yellow, lip shell-shaped, summer, Cent. America; *Darwinianum*, purplish-brown, autumn, Brazil; *fimbriatum*, greenish, spotted brown, lip fringed, variable, summer, Brazil, Paraguay; *Gnomus*, very variable, grotesque, greenish-red, purple spotted, various seasons, Brazil, Venezuela; *macrocarpum* (syns. *C. Claverlingii*, *C. tridentatum*), greenish, spotted purple-red, lip has 3 apical teeth, summer, Brazil; *pileatum* (syn. *C. Bungerothii*), large, often white, lip broadly shell-shaped, usually autumn, Brazil, Trop. America; *Rodigasianum*, flowers many, greenish, spotted purple-brown, summer, Brazil; *Russellianum*, white, striped green, beautiful, horns absent, summer, Guatemala; *splendens*, a beautiful variable natural hybrid between *macrocarpum* and *pileatum*, autumn, various, S. America, many vars. are known; *tabulare*, greenish, spotted red-brown, lip with a large table-like callus, various seasons, Colombia, Guatemala; *Warscewiczii* (syn. *C. surra*), much like a miniature *C. Russellianum*, spring, Demerara, Brazil, Guiana. A number of natural hybrids are known.

Catchfly, see *Silene*.

Catesbaea—*Rubiaceae*. Stove evergreen flowering shrub.

CULTURE: Compost, equal parts loam and peat, and a little sand. Position, well-drained pots and plenty of light. Pot in March. Water freely March to Sept., moderately afterwards. Temp., 55° to 65° Oct. to March, 75° to 85° afterwards.

PROPAGATION: By cuttings inserted in sand under bell-glass in a temp. of 75° in spring.

SPECIES CULTIVATED: *C. spinosa*, 'Lily Thorn', yellow, May, 10 ft., W. Indies.

Cathcartia, see *Meconopsis*.

Catmint, see *Nepeta Cataria*.

Cat-tail, see *Typha*.

Cattleya—*Orchidaceae*. An important evergreen, epiphytic genus. Not only are the species appreciated but orchid collections are enriched by great numbers of hybrids derived from the species themselves, crosses between the hybrids and crosses with *Laelia*, *Brassavola*, *Digbyana* and *Sophranitis*. Hybrids have also been obtained with *Epidendrum*, *Schomburgkia*, *Leptotes*, etc. Cattleyas may be broadly divided into two sections, one with clavate pseudo-bulbs carrying a single large leaf, e.g. *C. labiata*. Many have flowers 6 to 8 in. across. The labellums have no definite divisions between the side lobes and frontal lobe, which is usually more richly coloured. The other group, with often tall, cylindrical stem-like pseudo-bulbs carrying two or more smaller, fleshy leaves, e.g. *C. Harrisoniana*. The inflorescence is terminal to the pseudo-bulbs. With one or two exceptions the peduncle is protected by a sheath through which it forces its way before flowering.

CULTURE: Compost, three parts osmunda fibre, cut and cleaned, one part of chopped sphagnum moss and a liberal addition of finely broken potsherds; about a quarter of the pot should be filled with clean sherds. The larger the plant the firmer should the compost be made. Often a house is given up entirely to Cattleyas and their hybrids. With the species a rest is required in winter. Water should be given occasionally, the leaves should not approach flaccidity or the pseudo-bulbs shrivel. Resting temp., 55° to 60° at night; summer temp. 65° to 80°, a moist sweet atmosphere is essential, particularly in summer. Expose to light in autumn. Shading can usually be dispensed with in Sept. Avoid draughts. Repot if required when growth is expected.

PROPAGATION: By division of plants when potting. The rhizome may be cut through leaving four bulbs at least in front of the severance and an incipient 'eye' may then grow.

SPECIES CULTIVATED: *C. Aclandiae*, olive-green, purple spotted, lip rich purple, dwarf, pans, summer, Brazil; *amethystoglossa*, rose, purple spotted, up to 20, spring, Brazil, var. *Sanderæ*, pure white; *aurantiaca* (syn. *Epidendrum aurantiacum*), small, many, orange-red, summer, Mexico, Guatemala; *bicolor*, bronze-green, lip rose-purple, variable, autumn, Brazil; *Bourlingiana*, variable, rose-purple, late autumn, Honduras; *citrina*, yellow, pendent, cool house, spring, Mexico; *Dormaniana* (syns. *Laelia Dormaniana*, *Laelio-cattleya Dormaniana*), olive-brown, purple dotted, lip rose-purple, summer, autumn, Brazil; *elongata* (syn. *C. Alexandrae*), dark rose, peduncle 12 in. high, spring, Brazil; *Forbesii*, yellowish-green or whitish, lip lined red, summer, Brazil; *granulosa*, olive-green, spotted purple, lip crimson, asperated, late summer, Brazil, var. *Schofieldiana*, larger; *guttata*, yellowish, spotted purple-red, lip white, rose-purple, summer, autumn, Brazil; *Harrisoniana*, light rosy-mauve, variable, summer, autumn, var. *alba*, white; *intermedia*, pale rose, lip rose-purple, summer, Brazil; *Loddigesii*, distinguished from *C. Harrisoniana* by paler colour and smooth disk of lip, various, Brazil, var. *alba*, pure white; *Schilleriana*, olive green, shaded red, lip red-purple, variable, summer, Brazil; *Skinneri*, rose-purple, early summer, Guatemala, var. *alba*, white; *velutina*, very fragrant, orange yellow, spotted and striated purple, summer, Brazil; *violacea*, purple or violet purple, lip deep violet-purple, summer, British Guiana, Brazil; *Walkeriana*, soft rose, lip purple, winter, Brazil. Clavate-bulbed section—*Dowiana*, fragrant, yellow, crimson, marked crimson-purple and old gold, summer, autumn, Costa Rica, Brazil, many vars. are known; *Eldorado*, fragrant, pale rose, rich purple, autumn, Brazil, var. *virginalis*, pure white, many other vars.; *Gaskelliana*, variable, fragrant, rose to purple-rose, June, July, Venezuela, Brazil, many vars.; *iricolor*, white with some purple streaks and 2 blotches, very rare; *labiata*, very variable, light to dark rose, the lip not distinctly lobed, crimson, October, Brazil, many vars. in varying colours; *Lueddemanniana*, rose, light or dark, lip amethyst, trumpet-shaped, summer, autumn, Venezuela; *luteola*, dwarf-growing, small, yellowish, summer, autumn, Brazil; *maxima*, pale rose, autumn, winter, Ecuador, Peru; *Mendelii*, light blush, lip often crimson-purple, May to June, Brazil, many richly coloured vars. known; *Mossiae*, light rose, lip crimson, rose and yellow, frilled, May, June, Venezuela; *Percivalliana*, rather small in comparison, rose to deep rose, lip frilled, magenta-crimson, pink, tawny-yellow and sepia markings, early winter, Venezuela; *quadricolor*, near *Trianae*, smaller, fragrant, blush-white, lip with purplish suffusions, autumn, winter, Brazil; *Rex*, creamy-white to yellow, lip crimson-red, summer, Peru, Andes; *Schroderae*, variable, fragrant, light rose, throat of lip orange, lip often purple, March to May, Brazil; *Trianae*, light rose, lip rose-purple, often deep, very variable, Dec. to Feb., Brazil; *Warneri*, rose to purple-rose, lip purple-red, May to July, Brazil; *Warszewiczii*, very large, rose, crimson and purple lip, summer, autumn, Brazil, many vars.

Cauliflower, see *Brassica oleracea* var. *botrytis*.

Caulophyllum—*Berberidaceae*. Hardy tuberous-rooted perennial. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, shady. Plant, Nov.

PROPAGATION: By division of roots March to Nov.

SPECIES CULTIVATED: *C. thalictroides*, 'Blue Cohosh', yellow, April, succeeded by blue berries in autumn, 1 ft., N. America.

Cantleya—*Zingiberaceae*. Herbaceous, semi-tuberous-rooted plants.

CULTURE: Soil, sandy, peaty, cool. Position, half-shade or north aspect.

PROPAGATION: By seed or, when possible, division of the roots in spring when growth commences.

SPECIES CULTIVATED: *C. lutea*, yellow, 12 in., summer, Himalaya.

Cayenne Pepper, see *Capsicum frutescens* var. *longum*.

Ceanothus—*Rhamnaceae*. Hardy and half-hardy evergreen and deciduous flowering shrubs. The majority of deciduous species are hardy in the open in the south, they make excellent wall shrubs and should be given this protection in colder districts. For the most part evergreen species are not really hardy. In warm localities they make fine specimens in the open but in most districts are better for wall protection. Very adaptable for training. First introduced early eighteenth century.

CULTURE: Soil, light ordinary. Position, against south or west walls or fences outdoors, in pots in cool greenhouse. Plant, Oct. to March. Pot, Oct. Prune deciduous kinds fairly severely in March, the evergreen kinds should have flowering shoots shortened as blossoms fade.

PROPAGATION: By cuttings 3 in. long in pots of sandy soil in cold frame in cool greenhouse in Sept.

SPECIES CULTIVATED: Deciduous—*C. americanus*, 'New Jersey Tea', 'Mountain Sweet', white, July, 5 ft., E. America; *caeruleus* (syn. *C. azureus*), blue, July to autumn frosts, 8 to 10 ft., Mexico; *Delilianus* (syn. *C. Arnouldii*), blue, July to Sept., 3 to 4 ft., hybrid, the well-known var. *Gloire de Versailles* belongs here; *Fendleri*, bluish white, 4 to 6 ft., Rocky Mountains; *integerrimus*, white to pale blue, June, 9 to 12 ft., California; *ovatus*, white, June to Aug., 2 to 3 ft., U.S.A. Evergreen—*C. Burkwoodii*, deep blue, hybrid; *dentatus*, blue, May, 10 ft., California; *papillosus*, blue, June, 10 to 12 ft., California; *rigidus*, rather tender, violet, April, 6 to 12 ft., California; *thyrsiflorus*, 'Californian Lilac', blue, occasionally white, May to June, 15 to 30 ft., one of the hardiest, California; *Veitchianus*, bright blue, 10 ft., hybrid.

Cedar, see *Cedrus*; -of **Lebanon**, see *Cedrus libanensis*.

Cedrela—*Meliaceae*. Hardy deciduous ornamental-leaved tree with coloured wood, furnishing valuable timber. The wood of *C. odorata* is extensively used for cigar boxes. First introduced mid-nineteenth century.

CULTURE: Soil, good ordinary, well drained. Position, sheltered on lawns or in shrubberies. Plant in autumn.

PROPAGATION: By root cuttings.

SPECIES CULTIVATED: *C. odorata*, to 100 ft., flowers yellowish, W. Indies, S. America; *sinensis*, 'Bastard Cedar', white and pink, June, 30 to 70 ft., China.

Cedronella—*Labiatae*. Rather tender shrubby herb. Leaves fragrant. First introduced late seventeenth century. See also *Brittonastrum*.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Pot, March. Position, pots in sunny greenhouse, may be grown at base of a south wall in dryish soil in South of England. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°. Water moderately in autumn and winter, freely other times.

PROPAGATION: By cuttings of young shoots inserted in pots of sandy soil in temp. 75° in March, April or May.

SHRUBBY SPECIES CULTIVATED: *C. canariensis*, 'Balm of Gilead', purple, July, 3 ft., Canaries.

Cedrus—*Pinaceae*. Hardy, evergreen coniferous trees. Wood of Cedar of

Lebanon used in ancient times as incense. Oldest cedar in England at Brethby Park, Derbyshire; planted in 1676. Cones not produced by *Cedrus libani* until tree is 40 to 100 years old.

CULTURE: Soil, rich, deep, sandy. Position, well drained, elevated. *C. atlantica* does well in seaside gardens; and all are suitable for chalky soils. Plant, Sept. to Nov., or March to May.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in well-drained pans of light soil in cold frame in April, transplanting seedlings outdoors following spring; garden forms by grafting on seedlings of the type plant in warm house in early spring.

SPECIES CULTIVATED: *C. atlantica*, 'Mount Atlas Cedar', 80 to 100 ft., N. Africa, vars. *argentea*, foliage intense grey-blue, *aurea*, golden, *glauca*, bluish; *Deodara*, 'Deodar Cedar', 200 to 250 ft., Himalaya, and vars. *crassifolia*, *robusta* and *viridis*; *libanensis* (syns. *C. libani*, *C. libanotica*), 'Cedar of Lebanon', 80 ft., Mt. Lebanon and Asia Minor, var. *glauca*, glaucous-leaved.

Ceiba—*Bombacaceae*. Stove deciduous tree. Yields the kapok of commerce. First introduced mid-eighteenth century.

CULTURE: Compost, three parts loam, one part each leaf-mould, decayed manure and sand. Position, large pots or borders in warm greenhouse. Pot or plant, Nov. or March.

PROPAGATION: By seeds sown in Feb. in sandy soil in temp. 80° to 85°.

SPECIES CULTIVATED: *C. pentandra* (syn. *Eriodendron anfractuosum*), 'Silk-cotton Tree', white or rose, seeds with cotton-like fibre, up to 120 ft., Tropics.

Celandine, Greater, see *Chelidonium majus*; **Lesser-**, see *Ranunculus Ficaria*; **-Poppy**, see *Stylophorum diphyllum*.

Celastrus—*Celastraceae*. Vigorous, hardy, deciduous shrubs and climbers. Grown for their attractive fruits. First introduced early eighteenth century.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, walls, arbours or clambering over trees. Plant, Oct. to March. Prune away weak shoots and tips of main shoots in Feb.

PROPAGATION: By layers of young shoots in autumn or spring.

HARDY SPECIES CULTIVATED: *C. angulatus*, green, seed capsules orange and bright red when open, 10 ft., shrubby, China; *orbiculata* (syn. *C. articulatus*), the most reliable fruiting kind, 30 ft., N.E. Asia; *scandens*, 'Staff-tree', yellow, summer, capsules orange with scarlet seeds, climbing, N. America.

Celeriac, see *Apium graveolens* var. *rapaceum*.

Celery, see *Apium graveolens*; **-Cabbage**, see *Brassica pekinensis*.

Celmisia (New Zealand Daisy)—*Compositae*. Evergreen perennials.

CULTURE: Soil, well-drained sandy loam, deep and friable. Position, full sun, warm sheltered places.

PROPAGATION: By seeds or cuttings of side rosettes in summer.

SPECIES CULTIVATED: *C. coriacea*, white, 9 to 12 in., New Zealand; *gracilentia*, white, 6 in., May to June, New Zealand; *holosericea*, white, 12 in., summer, New Zealand; *Lyallii*, white, 12 in., June, New Zealand; *spectabilis*, white, 12 to 15 in., summer, New Zealand.

Celosia—*Amaranthaceae*. Greenhouse annuals. First introduced mid-sixteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould and well-decayed cow manure and sand. Position, warm greenhouse, exposed to light. Sow seeds $\frac{1}{16}$ in. deep in well-drained pans of light soil in temp. 75° in March. Transplant seedlings 1 in. apart when 1 in. high in light soil in well-drained pots and keep in temp. 60° to 75°. When seedlings have formed four leaves place them singly in 4 in. pots, transferring them as required to 6 in. pots. Keep plants near the glass. Water roots moderately. Syringe foliage twice daily. Apply liquid manure when flowers appear. Summer temp., 55° to 65°. May be used for summer bedding between May and Sept.

CULTURE OF COCKSCOMBS: Sow seeds as above. When seedlings appear place them close to glass and keep moderately moist. Transplant, when seedlings have formed three leaves, into 2 in. pots in above compost. Place pots on shelf near glass until 'combs' show themselves. Select plants with finest 'combs' and place them in 4 in. pots; plunge these to rim on gentle hotbed (temp. 65° to 75°) and keep moderately moist at root. Syringe freely. Transfer plants when pots are full of roots into 6 in. pots and treat as before. Give liquid manure when 'combs' are well advanced. Good specimen of 'comb' should measure 9 to 12 in. long, 3 to 6 in. wide, and plant 6 to 9 in. high.

SPECIES CULTIVATED: *C. argentea*, white, summer, 2 ft., China, var. *cristata*, 'Cockscomb', red or crimson, summer, 2 ft., Tropics, and numerous vars. including *Childsii*, *plumosa*, *pyramidalis* and *Thompsonii*.

Celsia—*Scrophulariaceae*. Greenhouse and half-hardy annuals and perennials. First introduced mid-eighteenth century.

CULTURE: Compost, two parts fibrous loam, one part peat-moss or leaf-mould and sand. Pot, March to May or in autumn. Position, pots in sunny greenhouse or outdoors in borders. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°. Water carefully October to March, freely at other times.

PROPAGATION: By seeds sown in pans of sandy soil in temp. 60° in March or Aug. Cuttings of perennial species in spring or autumn under bell-glass in cool house or frame.

SPECIES CULTIVATED: *C. Arcturus*, yellow with purple anthers, 1 to 2 ft., Crete; *betonicifolia*, yellow, 2 ft., Algeria; *bugulifolia*, yellow, purple-veined, 16 in., Balkan Peninsula, Asia Minor; *cretica*, 'Cretan Mullein', yellow, 3 to 5 ft., Medit. Region; *sinuata*, yellow, 18 in., annual species of recent introduction, Medit. Region.

Celtis (Hackberry)—*Ulmaceae*. Hardy deciduous ornamental-leaved trees. First introduced mid-seventeenth century.

CULTURE: Soil, ordinary. Position, sunny shrubberies. Plant, Oct. to Feb. Prune, Nov. to Feb.

PROPAGATION: By seeds sown outdoors in spring; layering shoots in autumn or spring.

SPECIES CULTIVATED: *C. australis*, 'Nettle Tree', May, 50 to 70 ft., S. Europe; *Bungeana* (syn. *C. Davidiana*), 15 to 25 ft., N. China; *laevigata* (syn. *C. mississippiensis*), long narrow leaves, 60 ft., S. United States; *occidentalis*, spring, 40 to 130 ft., N. America.

Centaurea—*Compositae*. Hardy and tender perennials and annuals.

CULTURE OF ANNUAL SPECIES: Sow seeds outdoors in April where plants are required to flower. Thin seedlings when an inch or so high to 4 or 6 in. apart. Ordinary rich soil and a sunny position.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary good. Position, sunny borders. Plant, autumn or spring. Lift, divide, and replant every third or fourth year.

CULTURE OF TENDER SPECIES: Rear plants from seeds sown in heat in spring or summer, and grow on in pots in greenhouse; or from cuttings inserted in cold frame in July or Aug., lifting them when rooted and placing in pots in greenhouse. Plant out in beds end of May. Silvery foliage of these very striking for bedding.

PROPAGATION: By seeds sown outdoors in April, or in heat in spring, also by division of roots in autumn or spring.

ANNUAL SPECIES CULTIVATED: *C. americana*, rose or purple, Aug., 2 to 5 ft., N. America; *Cyanus*, 'Cornflower', blue, rose, white, etc., summer, 3 ft., Britain; *moschata*, 'Sweet Sultan', purple, summer, 2 ft., Orient, and vars. *alba*, white, *flava*, yellow, *rosea*, pink.

PERENNIAL SPECIES CULTIVATED: *C. babylonica*, yellow, July, 5 to 7 ft., Levant; *dealbata*, rose, summer, 18 in., Caucasus, var. *Steenbergii*, rose magenta, summer, 2 ft.; *glastifolia*, yellow, summer, 4 to 6 ft., Caucasus; *macrocephala*, yellow, July, 3 to 5 ft., Caucasus; *montana*, blue, July, 2 to 3 ft., Caucasus, Pyrenees, and vars. *alba*, white, *rosea*, rose; *nudicaulis*, pink, summer, 6 in., Asia Minor; *orientalis*,

yellow, summer, 3 ft., Europe; *ruthenica*, pale yellow, July to Aug., 3 to 4 ft., Caucasus and Siberia.

TENDER SPECIES CULTIVATED: *C. Cineraria*, 12 to 18 in., Italy; *Clementei*, 2 to 3 ft., Spain; *gymnocarpa* (syn. *C. argentea*), 2 ft., S. Europe; *ragusina*, 2 ft., S. Europe

Centaureum (Centaury)—*Gentianaceae*. Hardy annual herbs and perennial alpine plants. Formerly known as *Erythraea*.

CULTURE: Soil, sandy loam. Position, sunny rockeries or borders. Plant, spring.

PROPAGATION: By cuttings or division for perennials; seeds for annuals.

SPECIES CULTIVATED: *C. portense* (syn. *Erythraea portense*), bright rose, summer, 4 in., W. Europe, incl. Britain; *Scilloides* (syn. *Erythraea Massonii*), white, summer, Azores; *vulgare* (syn. *Erythraea Centaureum*), pink, June to Sept., 6 to 12 in., Britain.

Centaury, see *Centaureum*.

Centipede Plant, see *Homalocladium platycladum*.

Centradenia—*Melastomaceae*. Stove flowering evergreen shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part loam and sand. Position, sunny. Pot, Feb. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°. Water moderately Sept. to March, freely afterwards.

PROPAGATION: By cuttings of side-shoots 2 or 3 in. long inserted in pots of sandy peat under bell-glass in temp. 85° in Feb. and March.

SPECIES CULTIVATED: *C. floribunda*, red, July, 18 in., Mexico; *grandifolia*, pink, Sept., 18 in., Mexico; *inaequilateralis* (syn. *C. rosea*), rose, April, 1 ft., Mexico.

Centranthus (Valerian)—*Valerianaceae*. Hardy herbaceous perennials and annuals. Sometimes spelled *Kentranthus*.

CULTURE: Soil, ordinary. Position, old walls, sunny rockeries, borders. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 55° in March, transplanting seedlings outdoors in May; or in sunny positions outdoors in April or June, transplanting seedlings in May or Aug.; perennials also by division in autumn or spring.

ANNUAL SPECIES CULTIVATED: *C. macrosiphon*, red, July, 2 ft., Spain, var. *albus*, white.

PERENNIAL SPECIES CULTIVATED: *C. ruber* 'Red Valerian', 'Spur Valerian', red, June to Sept., 18 in., Europe incl. Britain, var. *albus*, white.

Centropogon—*Lobeliaceae*. Stove herbaceous perennial from Trop. America.

CULTURE: Compost, equal parts loam, peat, leaf-mould and a little sand. Pot, March. Position, stove Sept. to June; June to Sept. sunny frame outdoors. Temp., Oct. to Feb. 50° to 55°, Feb. to June 60° to 75°. Water moderately Sept. to Feb., freely afterwards. Prune shoots close to soil in Feb. when repotting.

PROPAGATION: By cuttings of young shoots 3 in. long, removed with a portion of stem attached, and inserted in light sandy soil in well-drained pots under bell-glass in temp. 60° to 70°.

SPECIES CULTIVATED: *C. Lucyanus*, rose, autumn, 2 ft., a hybrid.

Centrosema—*Leguminosae*. Stove evergreen climber.

CULTURE: Compost, equal parts peat, loam, leaf-mould and silver sand. Position, pots on staging, shoots trained up rafters or round a trellis or sticks. Pot in March. Water freely in spring and summer, moderately in winter. Temp., March to Sept. 75° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By seeds in a temp. of 75° in March; also by cuttings in sand in a temp. of 85° in summer.

SPECIES CULTIVATED: *C. Plumieri* (syn. *Clitoria Plumieri*), red and white, autumn, 6 ft., S. America.

Century, see *Blackstonia perfoliata*; **-Plant**, see *Agave americana*.

Cephalanthera—*Orchidaceae*. Hardy terrestrial deciduous orchids with leafy stems and flowers in spikes.

CULTURE: Soil, chalky loam. Position, rather shady, open well-drained border. Plant, Sept. and Oct.

PROPAGATION: By division of plants in Sept.

SPECIES CULTIVATED: *C. Damasonium* (syns. *C. grandiflora*, *C. pallens*), white and yellow, June, 18 in., Britain, Europe; *falcata*, flowers yellow, sessile, in terminal spikes to 5 in. long, China, Japan; *longifolia* (syn. *C. ensifolia*), white, June, 2 ft., Britain; *rubra*, purple and white, May, 18 in., Britain.

Cephalanthus (Button-bush)—*Rubiaceae*. Hardy deciduous shrub of no great garden value. First introduced mid-eighteenth century.

CULTURE: Soil, sandy peat. Position, shrubberies, dislikes dry positions. Plant, Oct. or Nov.

PROPAGATION: By layers of shoots in Sept. or April.

SPECIES CULTIVATED: *C. occidentalis*, white, Aug., 7 ft., N. America.

Cephalaria (Giant Scabious)—*Dipsacaceae*. Hardy herbaceous scabious-like perennials. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, borders or woods. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sunny position outdoors in April, transplanting seedlings in May.

SPECIES CULTIVATED: *C. alpina* (syn. *Scabiosa alpina*), yellow, July, 5 ft., Europe; *tatarica*, yellow, July, 5 ft., Siberia.

Cephalotaxus (Plum Yew)—*Taxaceae* (or *Cephalotaxaceae*). Hardy evergreen coniferous trees. Leaves similar to those of Yew. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sheltered shrubberies or lawns preferably in shade. Plant, Sept. to Nov. or March to May.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in light soil in cold frame in Sept. or March, transplanting seedlings outdoors a year after; cuttings of shoots 3 in. long inserted in sandy soil in shady cold frame, or under bell-glass or hand-light outdoors in Aug. or Sept.

SPECIES CULTIVATED: *C. drupacea*, 10 to 30 ft., Japan, and var. *prostrata*, a useful covering plant for dense shade; *Fortunei*, 10 to 20 ft., N. China.

Cephalotus—*Saxifragaceae*. Greenhouse herbaceous perennial. Pitchers, 1 to 3 in. long, dark green, purple and pink. First introduced early nineteenth century.

CULTURE: Compost, equal parts sphagnum moss, fibrous peat and silver sand. Position, pots or pans, well drained and covered with bell-glass; shady cool greenhouse or window. Temp., Oct. to March 45° to 55°, March to Oct. 50° to 55°. Water moderately Sept to April, freely afterwards.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *C. follicularis*, 'Australian Pitcher Plant', 2 to 4 in., white, Australia.

Cerastium—*Caryophyllaceae*. Hardy perennials.

CULTURE: Soil, ordinary. Position, dryish borders, rockeries and edgings to flower beds. Plant, March or April.

PROPAGATION: By division of plants in March or April; cuttings of shoots 3 in. long inserted in ordinary soil in shady position outdoors in June or July; seeds sown $\frac{1}{16}$ in. deep in shady position outdoors in April, transplanting seedlings in June or July.

SPECIES CULTIVATED: *C. alpinum*, white, June, 3 to 4 in., Britain, var. *lanatum*, prostrate, silvery woolly foliage, white, spring; *Biebersteinii*, white, June, 6 in., leaves silvery, Asia Minor; *Boissieri*, white, June, 8 to 9 in., leaves silvery; *grandiflorum*, white, July, 6 in.; *tomentosum*, 'Snow in Summer', white, May, 6 in., leaves silvery, Europe.

Cerasus, see *Prunus*.

Ceratonia—*Leguminosae*. Tender evergreen tree, but only a small shrub in this country. The fleshy pods are edible. First introduced mid-sixteenth century.

CULTURE: Position, against south walls; suitable for S. and W. of England only, or in conservatories or unheated greenhouses. Plant, Sept. to Nov. or March to May.

PROPAGATION: By seeds sown 1 in. deep in pots of sandy soil in temp. 85° in March, transplanting seedlings outdoors in June; cuttings of firm shoots 4 in. long inserted in sandy soil under bell-glass in cold frame or greenhouse in Aug. or Sept.

SPECIES CULTIVATED: *C. Siliqua*, 'Carob', 'St. John's Bread', yellow and red, Sept., 40 to 50 ft., S. Europe.

Ceratophyllum (Hornwort)—*Ceratophyllaceae*. Submerged aquatics, with bristly foliage, for pond or cold water aquarium.

CULTURE: Soil, loam or aquarium compost. Position, base of pond or aquarium. Plant, spring and summer.

PROPAGATION: Slips inserted as cuttings or bunches of growth weighted and dropped into pond.

SPECIES CULTIVATED: *C. demersum*, dark green, forked growth, 1 to 3 ft., Europe (Britain); *submersum*, paler, Europe (Britain), Trop. Asia, Florida.

Ceratopteris (Floating Fern; Indian Fern; Water Fern)—*Ceratopteridaceae*. Only true water ferns, much used by aquarists, floating or submerged.

CULTURE: Soil, sifted loam and charcoal with a little leaf-mould. Position, in pots or pans submerged to rim in tank of water for floating kinds, submerged kinds in aquarium compost. Plant, spring or summer. All need subdued light, moist, warm atmosphere. Temp., Sept. to March 55° or 60°, March to Sept. about 75°.

PROPAGATION: By spores sown in Feb. on surface of compost in pan of water as above; viviparous forms increased by pegging down leaves into soft mud, detaching later.

SPECIES CULTIVATED: *C. pteridoides*, pale green, floating, viviparous, fleshy, S. America; *thalictroides*, 'Pod Fern', annual, finely-cut foliage, Trop. America.

Ceratostigma—*Plumbaginaceae*. Half-hardy trailing shrub or herbaceous perennials with flowers like Plumbago.

CULTIVATION: Soil, light loam, sunny position at foot of wall or on rockery. Cut older or dying shoots hard back in April.

PROPAGATION: By removal of rooted offsets in April.

SPECIES CULTIVATED: *C. Griffithii*, blue, low, much-branched shrub, India; *plumbaginoides* (syn. *Plumbago Larpentae*), deep blue, to 1 ft., Aug., Sept., China; *Willmottianum*, makes a spreading 3 ft. bush, or may be trained to wall, sky blue flowers from June to early winter, W. China.

Cercidiphyllum—*Cercidiphyllaceae*. Hardy deciduous tree, but only a shrub to 20 ft. in this country. Good autumn tints. First introduced late nineteenth century.

CULTURE: Soil, well-drained, peaty loam. Position sheltered from early frosts and cold winds.

PROPAGATION: By seeds sown in pans or boxes in cool greenhouse or frame in March, or by layering in spring.

SPECIES CULTIVATED: *C. japonicum*, 50 to 100 ft., Japan, China.

Cercis—*Leguminosae*. Hardy, deciduous flowering trees. First introduced late sixteenth century.

CULTURE: Soil, rich, deep, sandy. Position, warm sheltered shrubberies, or on lawns. N. of England against south wall. Plant, Oct. to March.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in light sandy soil in temp. 55° to 65° in March, transplanting seedlings outdoors in June, or by layers of strong shoots in autumn or spring.

SPECIES CULTIVATED: *C. canadensis*, 'Red-bud', pale rose, May to June, 15 to 40 ft., N. America; *chinensis*, pink, May, 20 to 50 ft., tender, China and Japan;

Siliquastrum, 'Judas-tree', purple or rose, the best species for gardens, eventually a spreading tree 15 to 40 ft., flowering April before the leaves appear, S. Europe.

Cereus—*Cactaceae*. Greenhouse succulent plants. Many species formerly included in this genus have now been transferred to *Aporocactus*, *Echinocereus*, *Selenicereus*, etc. First introduced late seventeenth century.

CULTURE: Compost, two parts fibrous loam, one part coarse sand and broken brick. Position, well-drained pots in sunny greenhouse or window. Pot every two or three years as required. Water sparingly. Temp. Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown in well-drained pots or boxes; cuttings of stems in pots of sand kept just moist.

SPECIES CULTIVATED: *C. aethiops* (syn. *C. caeruleus*), white, July, Mexico; *kewensis*, pink and white, hybrid; *peruvianus*, red, Aug., Peru; *tetragonus*, red, to 6 ft., Brazil; *variabilis*, green and red, July, S. America.

Cerithe (Honeywort)—*Boraginaceae*. Hardy annuals and a few perennials. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, sunny well-drained beds or borders. Plant perennial species Oct. or April.

PROPAGATION: Annuals by seeds sown $\frac{1}{8}$ in. deep in April where plants are to flower, or in boxes of light sandy soil in temp. 55° to 65° in March, transplanting seedlings outdoors in May; thin outdoor-sown seedlings to 2 in. apart; perennials by seeds similar to annuals and by division of roots in April.

ANNUAL SPECIES CULTIVATED: *C. major*, 'Wax-plant', yellow and purple, July, 1 ft., Alps; *retorta*, yellow and violet, July, 18 in., Greece.

Ceropegia—*Asclepiadaceae*. Greenhouse trailing plants.

CULTURE: Compost, equal parts peat, loam, leaf-mould and silver sand. Position, baskets or pots suspended from roof of greenhouse, or in rockeries; sunny. Pot, March. Water moderately between March and Sept., occasionally afterwards. Temp., March to Sept. 55° to 65°, afterwards 45° to 50°.

PROPAGATION: By cuttings of slender shoots inserted in silver sand, in well-drained pots, in a temp. of 65° in spring.

SPECIES CULTIVATED: *C. bulbosa*, purple and green, India; *elegans*, white, brown and purple, summer, 3 to 4 ft., India; *Gardneri*, white and purple, Ceylon; *Sandersonii*, green, autumn, 3 ft., Natal; *Thorncroftii*, green, white and red, S. Africa; *Thwaitesii*, yellow, spotted red, Ceylon; *Woodii*, white and purple, summer, 2 to 3 ft., S. Africa.

Ceropteris, see *Pityrogramma*.

Cestrum (Bastard Jasmine)—*Solanaceae*. Greenhouse, flowering, evergreen or semi-evergreen shrubs. Some species formerly known as *Habrothamnus*. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, pots or beds with shoots trained on wall, pillars, or roof of greenhouse. Pot, March. Prune into shape, Feb. Temp., Sept. to March 40° to 50°, March to Sept. 55° to 60°. Water moderately in winter, freely other times.

PROPAGATION: By cuttings of side-shoots 3 or 4 in. long, removed with portion of old stem attached, inserted in well-drained pots of sandy soil in temp. 65° to 75° in July, Aug. or Sept.

SPECIES CULTIVATED: *C. aurantiacum*, orange-yellow, June, 5 ft., Guatemala; *fasciculatum*, purplish-red, 5 ft., Mexico, var. *Newellii*, crimson; *Parquii*, greenish; white or yellow, June to July, 7 ft., Western S. America; *psittacinum*, orange and yellowish-green, autumn, 20 ft., C. America; *purpureum* (syn. *C. elegans*), carmine, spring, 10 ft., Mexico, and var. *Smithii*.

Ceterach, see *Asplenium Ceterach*.

Chaenomeles (Flowering Quince)—*Rosaceae*. Hardy and easily-grown shrubs of great beauty, flowering in early spring before the leaves. The quince-like fruits

are useful for preserves. Formerly included in the genera *Cydonia* and *Pyrus*. *C. speciosa* is the 'Japonica' of gardens.

CULTURE: Any garden soil. Position, sheltered if in open border, or walls of any aspect, makes attractive hedge. May be pruned in Sept. to restrict size, spur pruning as for apples.

PROPAGATION: By layering; grafting on common quince; or seed to produce new varieties.

SPECIES CULTIVATED: *C. cathayensis*, thorny bush to 10 ft., large, pink-flushed flowers, April, China; *japonica* (syn. *Cydonia Maulei*), dwarf-spreading shrub to 3 ft., blood-red, Japan, and var. *atrosanguinea*, dark red; *speciosa* (syn. *Cydonia japonica* hort., *Chaenomeles lagenaria*), spreading bush to 10 ft., or trained considerably higher, scarlet flowers, March to June, China, many named vars.

Chaenorrhinum—*Scrophulariaceae*. Annual or perennial herbs, once included in *Linaria*.

CULTURE: Soil, ordinary. Position, moist rockeries or margins of borders.

PROPAGATION: By division; seed.

SPECIES CULTIVATED: *C. minus*, lilac, summer, to 1 ft., annual, Europe; *origanifolium* (syn. *Linaria origanifolia*), pale purple with orange palate, summer, 6 to 9 in., France, Spain, Portugal.

Chaenostoma—*Scrophulariaceae*. Greenhouse and half-hardy evergreen plants. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould with admixture of silver sand and crushed mortar rubble. Position, pots or hanging baskets in sunny greenhouse. Beds or borders out of doors, June to Sept. Water moderately Sept. to March, freely at other times. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown in sandy soil in gentle heat during spring; cuttings of side-shoots inserted in sandy soil under bell-glass or in propagator in temp. 60° during autumn or spring.

SPECIES CULTIVATED: *C. grandiflorum* (syn. *Sutera grandiflora*), lavender-blue, scandent, summer, S. Africa.

Chaerophyllum—*Umbelliferae*. Hardy biennial. Roots carrot-like, grey or blackish with yellowish-white flesh, sweet; cooked and served as carrots.

CULTURE: Soil, ordinary. Position, sunny beds outdoors. Lift roots in Aug. and store them in dry, dark place until required for use.

PROPAGATION: By seeds sown 1 in. deep in drills 1 ft. apart in Aug. or Sept., which do not germinate until spring. Thin out seedlings to 8 in. apart in May.

SPECIES CULTIVATED: *C. bulbosum*, 'Turnip-rooted Chervil', white, June, 2 to 3 ft., Europe. See also *Anthriscus*.

Chain Fern, see *Woodwardia*; **-Orchid**, see *Dendrochilum*.

Chalk Plant, see *Gypsophila paniculata*.

Chamaecyparis (False Cypress)—*Pinaceae* (or *Cupressaceae*). Hardy evergreen coniferous trees with small scale-like leaves.

CULTURE: As *Cupressus*.

HEDGE CULTURE: Trench soil, 3 ft. wide and deep, adding a little well-rotted manure. Plant 2 ft. high shrubs 2 ft. apart in Sept. or Oct. Trim annually in May and July. *C. Lawsoniana* is the best species for hedging. The various coloured forms with varying degrees of vigour are useful for formal planting and stand trimming well if this is done regularly and at the correct season.

PROPAGATION: As *Cupressus*.

SPECIES CULTIVATED: *C. Lawsoniana*, 'Lawson's Cypress', pyramidal habit, 100 to 150 ft., California, and vars. *Allumii*, glaucous foliage, columnar form, *argentea*, silvery foliage, *aurea*, foliage golden when young, *darleyensis*, low form, *Ellwoodii*, compact, slow-growing dwarf with grey-green foliage, *erecta*, columnar form, *Forsteckiana*, branchlets twisted, *glauca*, leaves steel-blue, *nana*, dwarf form, *nidi-*

formis, horizontal branches from dense centre, and many others; *nootkatensis*, pyramidal habit, 100 to 120 ft., Western N. America; *obtusa* (syn. *Retinospora obtusa*), spreading habit, 50 to 70 ft., Japan, and vars. *albo-spica*, *aurea*, *compacta*, *filicoides*, *gracilis*, *lycopodioides*, *magnifica*, *nana*, *pendula*, *pygmaea*, etc.; *pisifera* (syn. *Retinospora pisifera*), slender, graceful habit, 70 to 100 ft., Japan, and vars. *filifera*, *plumosa*, *squarrosa*, all dwarfer than the type; *thyoides*, 'White Cedar', 80 to 90 ft., U.S.

Chamaedaphne—*Ericaceae*. Hardy, evergreen flowering shrubs. First introduced early eighteenth century.

OUTDOOR CULTURE: Soil, equal parts peat, leaf-mould and silver sand. Position, open sheltered borders, rockeries, or bogs. Plant, Sept. to Nov., or March. Prune straggling shoots only moderately after flowering. Water freely in dry positions during summer.

POT CULTURE: Soil, equal parts peat, leaf-mould and fine silver sand. Position, well-drained pots in cold greenhouse, Nov. to June; in shady position outdoors, June to Nov. Pot, Oct. to Nov. Water moderately, Nov. to March, freely afterwards.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in sandy peat in cold frame, Nov. or March; layering shoots in Sept.; division of plants, Oct. or Nov.

SPECIES CULTIVATED: *C. calyculata* (syns. *Cassandra calyculata*, *Andromeda calyculata*), white, spring, 3 ft., N. America, and var. *nana*, a more compact form to 18 in.

Chamaedorea—*Palmae*. Stove palms. Ornamental foliage. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part loam and sand. Position, shady part of stove in pots or tubs. Pot, March. Water moderately Sept. to March, abundantly afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By seeds sown 1 in. deep in above compost in pots, in temp. 85° in March.

SPECIES CULTIVATED: *C. elatior*, 20 to 30 ft., Mexico.

Chamaelirium—*Liliaceae*. Hardy, herbaceous, tuberous-rooted perennial. Introduced mid-eighteenth century.

CULTURE: Soil, loam and leaf-mould. Position, cool, moist and shady. Best grown in colonies. Plant in March.

PROPAGATION: By seeds sown soon as ripe in loam, peat and leaf-mould in a cold frame. Division of the root-stock in March.

SPECIES CULTIVATED: *C. luteum* (syn. *C. carolinianum*), 'Fairy Wand', yellow, June and July, 18 in., N. America.

Chamaenerion, see *Epilobium*.

Chamaepeuce, see *Cirsium*.

Chamaerops—*Palmae*. Greenhouse and half-hardy palm. Leaves, fan-shaped, green. First introduced early eighteenth century.

CULTURE: Compost, two parts rich loam, one part decayed leaf-mould and sand. Position, well-drained pots in greenhouse or sheltered well-drained beds outdoors in S. of England. Pot, March. Plant, April. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°. Water moderately in winter, freely in summer.

PROPAGATION: By seeds sown 1 in. deep in light soil in temp. of 80° in Feb. or March; suckers removed from parent plant in April or Aug.

SPECIES CULTIVATED: *C. humilis*, 'Fan Palm', 'European Palm', 10 to 30 ft., S. Europe, N. Africa, and vars. *arborescens*, *bilaminata*, *dactylocarpa*, *elegans*, *macrocarpa* and *tomentosa*. See also the genus *Trachycarpus*.

Chamomile, see *Anthemis*.

Chandelier Flower, see *Brunsvigia Josephinae*.

Chaplet Flower see *Stephanotis floribunda*.

Chara (Stonewort)—*Characeae*. Submerged aquatics found in still waters in most parts of the world, sometimes used in ponds and aquariums.

CULTURE: Soil, ordinary. Position, entirely submerged. Plant, spring or summer by sinking weighted clumps.

PROPAGATION: Slips inserted as cuttings.

SPECIES CULTIVATED: *C. aspera*; *fragilis*, *hispida*, all very similar, rough to touch, Britain.

Chard, see *Beta vulgaris* var. *Cicla*.

Charlieis—*Compositae*. Hardy annual. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny borders or rock gardens.

PROPAGATION: By seed.

SPECIES CULTIVATED: *C. heterophylla*, rays blue, disk yellow or blue, summer, 6 to 12 in. S. Africa.

Chasmanthe—*Iridaceae*. Cormous plants formerly included in the genus *Antholyza*. First introduced mid-eighteenth century.

CULTURE: Soil, light sandy. Position, sunny well-drained borders or pots in cool greenhouse. Plant, 6 in. deep and 6 in. apart in border or 6 in a 6-in. pot in Oct. Lift in Aug., dry and store in a cool place till October.

PROPAGATION: By offsets at planting time; seeds in slight heat in spring.

SPECIES CULTIVATED: *C. aethiopica* (syn. *Antholyza aethiopica*), red and yellow, June to July, 3 to 4 ft., S. Africa; *caffra* (syn. *C. intermedia*, hort.), bright red, May, 1 ft., doubtfully hardy, S. Africa; *floribunda* (syn. *A. praealta*), orange and red, May to June, 3 to 4 ft., Cape; *vittigera*, yellow and red, summer, 3 ft., Cape.

Chaste Tree, see *Vitex Agnus-castus*.

Chatham Island Forget-me-not, see *Myosotidium Hortensia*.

Cheddar Pink see *Dianthus caesius*.

Cheilanthes (Lip Fern)—*Polypodiaceae*. Stove and greenhouse ferns. First introduced late eighteenth century.

CULTURE: Compost, two parts peat, one part loam and silver sand. Position, pots in shade. Pot, Feb. or March. Water moderately Oct. to Feb., freely afterwards. Temp. stove species, Sept. to March 55° to 65°, March to Sept. 65° to 75°; greenhouse, Sept. to March 45° to 50°, March to Sept. 55° to 65°. These ferns require less moisture than most.

PROPAGATION: By spores similar to *Adiantum*.

STOVE SPECIES CULTIVATED: *C. farinosa*, 12 to 18 in., Abyssinia, Java, etc.; *gracillima*, 'Lace Fern', 1 ft., N. America, also thrives in greenhouse temps.; *tenuifolia*, 1 ft., New Zealand, Australia, etc.

GREENHOUSE SPECIES CULTIVATED: *C. alabamensis*, to 10 in., N. America; *gracillima*, 6 to 8 in., N. Asia, etc.; *californica*, 1 ft., California; *myriophylla*, 9 in., Cent. America; *pteridioides*, 2 to 4 in., S. Europe.

Cheiranthus (Wallflower)—*Cruciferae*. Hardy perennials. Of biennial duration only on heavy soils. Botanically not distinct from *Erysimum*.

CULTURE OF WALLFLOWERS: Soil, ordinary well-drained, not too heavy, add lime or old mortar. Position, sunny borders, beds or old walls. Sow either broadcast or in drills 6 in. apart and $\frac{1}{2}$ in. deep in May. Transplant seedlings when third leaf has formed, 6 in. apart each way, in a bed of firm soil limed as before, and plant out finally a foot or so apart in Sept. or Oct. Make soil firm around plants to ensure sturdy firm growth. To grow on old walls, sow a pinch of seed in crevices, adding a little soil and cow manure to supply food to young plants; or plant young seedlings in similar compost in spring.

CULTURE OF DWARF SPECIES: *C. alpinus*, *kewensis* and *semperflorens* should be grown on sunny rockeries in good loamy soil and old mortar. Plant in spring. Top-dress annually in March with well-rotted cow manure.

POT CULTURE: Plant seedlings in good ordinary soil in 6 in. pots in Sept.; keep in sunny cold frame till flower buds form, then transfer to greenhouse. Water

moderately. Feed with liquid manure when in flower. Throw away after blooming.

PROPAGATION: By seed; cuttings.

SPECIES CULTIVATED: *C. alpinus*, yellow, May, 6 in., Scandinavia; *Cheiri*, (syn. *Erysimum Cheiri*) 'Wallflower', 'Gilliflower', various colours, spring, 1 to 2 ft., Europe (Br.); *kewensis*, sulphur, orange, purple, Nov. to May, 1 ft., hybrid; *semperflorens* (syn. *C. mutabilis*), purple, spring, 1 ft., Morocco. See also *Erysimum*. The plant known in gardens as *Cheiranthus Allionii*, 'Siberian Wallflower', is *Erysimum asperum*.

Cheiridopsis—*Aizoaceae*. Greenhouse succulent plants, formerly included in *Mesembryanthemum*.

CULTURE: As for *Mesembryanthemum* except water moderately from June to Dec., keep dry rest of year.

PROPAGATION: As for *Mesembryanthemum*.

SPECIES CULTIVATED: *C. candidissima* (*Mesembryanthemum candidissimum*), white or pale pink, 4 in., S.W. Africa; *C. cigarettifera* (*M. cigarettiferum*), yellow, 1½ in. S.W. Africa.

Chelidonium (Greater Celandine)—*Papaveraceae*. Hardy perennial or biennial.

CULTURE: Soil, ordinary. Position, damp shady borders. Plant, March or April.

PROPAGATION: By seeds sown ½ in. deep in shade outdoors in April; division of roots in April.

SPECIES CULTIVATED: *C. majus*, yellow, May, 2 ft., Britain, and vars. *flore pleno*, double, *laciniatum*, more finely divided leaves.

Chelone (Turtle-head)—*Scrophulariaceae*. Hardy herbaceous perennials. First introduced mid-eighteenth century.

CULTURE: Soil, rich, deep. Position, open borders. Plant, Oct. or March.

PROPAGATION: By seeds sown ⅛ in. deep in light soil in temp. 55° to 65° in March, or similar depth in soil in cold frame in April, transplanting seedlings outdoors in May and June; cuttings inserted in sandy soil in cold frame in June and July; division of plants in Aug. and Sept.

SPECIES CULTIVATED: *C. glabra*, white, Aug., 2 to 3 ft., N. America; *Lyonii*, purple, Aug., 2 to 3 ft., N. America; *obliqua*, 'Shell-flower', purple, Aug., 2 to 3 ft., N. America. See also *Penstemon*.

Chenopodium—*Chenopodiaceae*. Hardy perennials and annuals grown for edible leaves and young shoots.

CULTURE OF GOOD KING HENRY: Soil, good, well trenched, and liberally manured. Position, dryish, sunny. Sow seeds 1 in. deep in drills 12 in. apart in autumn as soon as ripe, or under glass in April. Thin seedlings out to 9 in. Cover bed in October with thin layer of manure. Gather young shoots before flower develops as substitute for asparagus; leaves in May and June in lieu of spinach. Renew beds every 3 or 4 years.

CULTURE OF WHITE QUINOA: Soil, ordinary. Position, open garden. Sow seeds in drills 1 in. deep and 2 ft. apart from March onwards at intervals of a few weeks. Gather leaves, cook, and eat like spinach.

PERENNIAL SPECIES CULTIVATED: *C. Bonus-Henricus*, 'Good King Henry', 'Lincolnshire Asparagus', 3 ft., Britain.

ANNUAL SPECIES CULTIVATED: *C. giganteum* (syn. *C. amaranticolor*), 6 ft., India, young leaves blood-red; *Quinoa*, 4 to 5 ft., Andes.

Chequer Berry, see *Mitchella repens*.

Chequered Daffodil or **Chequered Lily**, see *Fritillaria meleagris*.

Cherimoyer, see *Annona Cherimola*.

Cherokee Rose, see *Rosa laevigata*.

Cherry, see *Prunus*; **-Laurel**, see *Prunus Laurocerasus*; **-Pie**, see *Heliotropium peruvianum*; **-Plum**, see *Prunus cerasifera*.

Chervil, see *Anthriscus Cerefolium*; **Turnip-rooted-**, see *Chaerophyllum bulbosum*.

Chestnut, see *Castanea*; **Horse-**, see *Aesculus Hippocastanum*.

Chiastophyllum—*Crassulaceae*. Succulent plant, often included in *Cotyledon* or *Umbilicus*.

CULTURE: Light soil, in sun or half shade, rock garden.

PROPAGATION: Cuttings in July to Sept. in frame, division in Sept. or March.

SPECIES CULTIVATED: *C. oppositifolium* (syn. *Cotyledon oppositifolia*, *C. simplicifolia*, *Umbilicus oppositifolius*), yellow, summer, 6 in., Caucasus.

Chickweed Wintergreen, see *Trientalis europaea*.

Chicory, see *Cichorium Intybus*.

Chile Arbor-vitae, see *Libocedrus chilensis*; **-Bellflower**, see *Lapageria rosea*;

-Crocus, see *Tecophilaea cyanocrocus*; **-Glory Flower**, see *Eccremocarpus scaber*;

-Jasmine, see *Mandevilla suaveolens*; **-Pitcher Flower**, see *Sarmienta repens*;

-Rhubarb, see *Gunnera manicata*; **-Strawberry**, see *Fragaria chiloensis*.

Chilli, see *Capsicum frutescens* var. *grossum*.

Chimaphila—*Pyrolaceae*. Hardy dwarf herbaceous perennials. First introduced, mid-eighteenth century.

CULTURE: Compost, two parts leaf-mould, one part sand. Position, shady rockery outdoors. Plant, April.

PROPAGATION: By division of plants in April.

SPECIES CULTIVATED: *C. maculata*, 'Spotted Winter Green', pink and white, June, 6 in., N. America; *umbellata*, white and pink, June, 6 in., N. America.

Chimney Bellflower, see *Campanula pyramidalis*.

Chimonanthus—*Calycanthaceae*. Hardy deciduous flowering shrub. First introduced mid-eighteenth century.

CULTURE: Soil, deep, rich, sandy. Position, against south or west walls. Plant, Feb. Prune in Feb., cutting away all shoots that have flowered to within 1 in. of base, except those required to furnish plants with branches.

PROPAGATION: By layering shoots in Sept. or Oct, or from seed in spring.

SPECIES CULTIVATED: *C. praecox* (syns. *C. fragrans* or *Calycanthus praecox*), yellow and red, fragrant, Dec., 6 to 9 ft., China and Japan, var. *grandiflorus*, larger flowered, but not so intensely fragrant.

Chimonobambusa—*Gramineae*. Shrub with creeping root-stocks formerly included in *Arundinaria*.

CULTURE: Soil, good, not too heavy and of reasonable depth. Position, must be sheltered from cold winds and dry root conditions are disliked.

PROPAGATION: By division in April and May.

SPECIES CULTIVATED: *C. marmorea*, 3 ft., marbled stems, Japan.

China Aster, see *Callistephus*; **-Rose**, see *Rosa chinensis*.

Chinaman's Breeches, see *Dicentra spectabilis*.

Chincherinchee, see *Ornithogalum lacteum*.

Chin Chin, see *Ornithogalum lacteum*.

Chinese Hawthorn, see *Photinia serrulata*; **-Primrose**, see *Primula chinensis*;

-Rose Mallow, see *Hibiscus Rosa-sinensis*; **-Sacred Lily**, see *Narcissus Tazetta* var. *orientalis*; **-Yam**, see *Dioscorea Batatas*.

Chionanthus (Fringe Tree)—*Oleaceae*. Hardy deciduous flowering trees and shrubs. First introduced late eighteenth century.

CULTURE: Soil, sandy loam. Position, moist sheltered shrubbery. Plant, Oct. to Feb. *C. virginicus* suitable for pot culture for spring flowering in heated or cold greenhouses. Pot, Nov. Water moderately Nov. to April, freely afterwards. Plunge pot to rim outdoors from June to Feb.

PROPAGATION: By seeds sown in sandy soil in cold frame in April; grafting on Ash in March; budding on Ash in July.

SPECIES CULTIVATED: *C. retusus*, white, June to July, 8 to 30 ft., China; *virginicus*, 'Virginia Snowflower', white, June, 10 to 20 ft., Florida.

Chionodoxa (Glory of the Snow)—*Liliaceae*. Hardy, spring-blooming, bulbous plants. First introduced late nineteenth century.

OUTDOOR CULTURE: Soil, sandy loam. Position, sunny rockeries, well drained. Plant bulbs 1 in. apart and 3 in. deep in Sept. Lift and replant every three years.

POT CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Pot, Sept., planting 12 bulbs 1 in. deep in a 3 in. pot, well drained. Cover pot with ashes outdoors or in frame until Jan., then remove to window or greenhouse. Water moderately Jan. to April, freely April to June, none afterwards.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in boxes of light soil in cold frame in Aug.; offsets treated as mature bulbs.

SPECIES CULTIVATED: *C. cretica*, blue and white, March, 6 in., Crete; *Luciliae*, blue and white, March, 6 in., Asia Minor, and numerous vars.; *sardensis*, intense blue, with white stamens, March, 6 in., Asia Minor.

Chionographis—*Liliaceae*. Half-hardy herbaceous perennial. First introduced late nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand. Position, warm, well-drained south border outdoors, or pot in cold frame. Plant, Oct. or Feb. Pot, Feb.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in above compost in a pot, pan, or box in March, in cold frame; division of roots in Sept.

SPECIES CULTIVATED: *C. japonica*, white, May, 1 ft., Japan.

× **Chionoscilla**—*Liliaceae*. Bigeneric hybrid between *Chionodoxa* and *Scilla*.

CULTURE: As for *Chionodoxa*.

SPECIES CULTIVATED: *C. Backhousei*, blue and white, early spring, 4 in.

Chirita—*Gesneriaceae*. Stove herbaceous perennial and evergreen plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat and leaf-mould, half a part fibrous loam, and half a part of silver sand and charcoal. Pot, Feb. Shake away old soil from roots and put in small pots first, shifting into larger size when plants begin to grow. Water moderately at first, increasing supply when plants grow freely; keep nearly dry Oct. to Feb. Position, on shelf near glass. Liquid or artificial manure may be applied when flower buds appear. Temp., Nov. to Feb. 55° to 65°, Feb. to Nov. 70° to 85°.

PROPAGATION: By seeds sown in well-drained pots of above compost in March. Cover seeds with sprinkle of sand, place a square of glass over each pot and put latter in temp. 75° to 85°. Keep soil moderately moist. Transplant seedlings when three leaves are formed into small pots and treat as advised for old plants. Can be propagated also by large leaves, cutting their main ribs through and laying undersides on pans of sandy soil in temp. 65° to 75° in summer.

SPECIES CULTIVATED: *C. depressa*, violet, July, 6 to 8 in., China; *Horsefieldii*, white and purple, Sept., 18 in., Java; *lavandulacea*, lilac, 3 ft., Malaya and E. Indies; *lilacina*, white, blue and yellow, summer, 18 in., Chiriqui; *Marcanii*, orange, 2 to 3 ft., Siam; *Moonii*, blue and purple, June, 2 ft., Ceylon; *sinensis*, lilac, July, 6 in., China; *Walkerii*, yellow, June, 18 in., Ceylon; *zeylanica*, purple, June, 18 in., Ceylon.

Chironia—*Gentianaceae*. Greenhouse perennial plants. First introduced early nineteenth century.

CULTURE: Equal parts fibrous peat, loam and leaf-mould, with silver sand and crock chippings added to ensure porosity. Position, sunny part of greenhouse or frame. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°. Water carefully at all times, particularly during winter months.

PROPAGATION: By cuttings of side-shoots inserted in sandy soil, and placed in propagating case or under bell-glass in gentle heat in spring.

SPECIES CULTIVATED: *C. baccifera*, reddish-pink, June, 2 ft., S. Africa; *floribunda*, pink, June, 2 ft., S. Africa; *linoides*, reddish-pink, July, 1 to 2 ft., S. Africa.

Chives, see *Allium Schoenoprasum*; **Chinese-**, see *A. tuberosum*.

Chlidanthus—*Amaryllidaceae*. Half-hardy bulbous plant. First introduced early nineteenth century.

OUTDOOR CULTURE: Compost, equal parts peat, leaf-mould, loam and silver sand. Position, warm, well-drained bed or border outdoors in sandy loam and leaf-mould. Plant bulbs 3 in. deep in April. Lift bulbs in Oct. and store them in sand in frost-proof place during winter.

POT CULTURE: Plant bulbs 1 in. apart and 2 in. deep in above compost in 5 in. pots in April. Water moderately at first, freely when in active growth. Grow in cold frame or cool greenhouse. Withhold water from roots after Sept., until repotting time.

PROPAGATION: By offsets in April.

SPECIES CULTIVATED: *C. fragrans*, yellow, fragrant, June, 10 in., Peru.

Chlora, see *Blackstonia*.

Chloris—*Gramineae*. Hardy annual and perennial ornamental flowering grasses. Inflorescence suitable for winter decorations. Cut and dry when fully developed.

CULTURE: Soil, ordinary. Position, sunny borders. Sow seeds outdoors in April.

SPECIES CULTIVATED: *C. barbata*, 1 ft., annual E. Indies; *Gayana*, 3 ft., perennial, Africa; *truncata*, 1 ft. perennial, Australia; *virgata*, 1 ft., annual S. America.

Chlorogalum—*Liliaceae*. Hardy bulbous plant. First introduced early nineteenth century.

CULTURE: Soil, light. Position, south border, well drained. Plant bulbs 4 in. deep and 3 in. apart in Oct. or March. Replant every three years.

PROPAGATION: By offsets planted similarly to old bulbs; by seeds sown $\frac{1}{8}$ in. deep in well-drained pots of sandy soil in March.

SPECIES CULTIVATED: *C. pomeridianum*, 'Soap Plant', white and purple, June, 2 ft., California.

Chlorophytum—*Liliaceae*. Greenhouse plants. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand. Position, variegated and tall kinds in pots; drooping-stemmed species in pots or baskets suspended in window or greenhouse. Pot, March. Temp., Oct. to March 45° to 50°, March to Oct. 55° to 65°. Water moderately in winter, freely other times. May be used in summer bedding displays June to Sept.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of light soil in temp. 65° in March; by offshoots inserted singly in small pots under bell-glass in window or greenhouse in April; by division of roots when repotting.

SPECIES CULTIVATED: *C. capense* (syns. *C. Anthericum* and *Phalangium elatum*), white, summer, 12 to 18 in., S. Africa, var. *variegatum*, leaves variegated with creamy white; *comosum* (syn. *C. Sternbergianum*), white, summer, 1 to 2 ft., S. Africa.

Chocolate Tree, see *Theobroma Cacao*.

Choisya—*Rutaceae*. Hardy evergreen flowering shrub. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, ordinary loam with peat or leaf-mould. Position, sheltered shrubberies S. and W. of England and Ireland, against south walls N. of England. Good maritime shrub, grows well in chalky soils. Plant, Oct. or March. Prune after flowering, shortening straggling shoots only.

POT CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Pot, Sept. or Oct. Water moderately Sept. to March, freely afterwards. Keep plants in cool greenhouse Nov. to May, remainder of time outdoors.

PROPAGATION: By cuttings of shoots 3 in. long inserted in well-drained pots of

sandy soil under bell-glass in temp. 55° to 65°, March to June, or in cold frame Aug. to Sept.

SPECIES CULTIVATED: *C. ternata*, 'Mexican Orange', white, May, and usually again in autumn, 6 ft., Mexico.

Choke-berry, see *Aronia*; **-Cherry**, see *Prunus virginiana*.

Chordospartium—*Leguminosae*. Small, hardy, leafless weeping tree. A rare plant from the south island of New Zealand where it grows near running water.

CULTURE: Soil, well drained, fairly dry. Position, waterside in full sun.

PROPAGATION: By seed.

SPECIES CULTIVATED: *C. Stevensonii*, whitish, tinted pale lilac, 20 ft., May to July, New Zealand.

Chorizema—*Leguminosae*. Greenhouse, flowering evergreen shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous peat and loam, one-fourth sand. Position, pots, or in well-drained beds in greenhouses. Pot, March or June; firm potting essential. Prune straggling shoots slightly after flowering. Water freely March to Sept., moderately afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°. Stand plants outdoors from July to Sept. to mature flowering shoots for following year.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light sandy compost in temp. 65° to 70° in March; by cuttings in sandy peat under bell-glass in temp. 65° in summer.

SPECIES CULTIVATED: *C. cordatum*, red and yellow, April, 10 ft., Australia, and vars. *elatio*, red, *flavum*, orange-yellow; *diversifolium*, orange-red, May, 2 ft., Australia; *Henchmannii*, scarlet, May, 2 ft., Australia; *ilicifolium*, yellow, May, 3 ft., Australia; *varium* (syn. *C. Chandleri*), yellow and red, May, 4 ft., Australia.

Christmas Berry Tree, see *Schinus terebinthifolius*; **-Cactus**, see *Zygocactus*; **-Rose**, see *Helleborus niger*.

Christ's Thorn, see *Paliurus Spina-Christi*.

Chrysalidocarpus—*Palmae*. Stove palm.

CULTURE AND PROPAGATION: As *Areca*.

SPECIES CULTIVATED: *C. lutescens* (syn. *Areca lutescens*), 10 to 25 ft., Madagascar.

Chrysanthemum—*Compositae*. A large genus of greenhouse and hardy perennials and hardy annuals, some woody. First introduced mid-eighteenth century.

CULTURE OF ANNUALS: Soil, ordinary rich. Position, open sunny. Plant seedlings out in May, or sow seed outdoors where plants are to flower. Gather seed in Aug.

POT CULTURE: Transplant seedlings when 2 in. high, 4 in a 5-in. or 7 in a 6-in. pot. Compost, two parts good soil, one part leaf-mould or decayed manure and sand. Grow in cold frame or greenhouse. Water moderately. Thin flower buds for fine blooms. Give liquid manure when buds appear.

CULTURE OF MARGUERITES: Compost, equal parts loam and leaf-mould and fourth part silver sand. Insert cuttings singly, or three in a 4-in. pot in April, cover with bell-glass or place in propagating box. Pot rooted cuttings in 3-in. pots, moving into 5-in. in Aug. Stand plants in full sun from July to Sept., then in cold frame till Nov., and afterwards in greenhouse in temp. 50° to 55°. Water moderately. Give liquid manure when pots are full of roots. Alternatively, young plants may be hardened off in a frame for planting outdoors at end of May in sunny beds or borders. These plants can either be discarded at the end of summer or lifted, potted and placed in a greenhouse.

CULTURE OF INDOOR CLASSES: Incurved—petals curving inwards; Anemone-flowered—dense centres and petals fringing their base; Pompons—small flowers, petals reflexed, fringed or toothed; Singles—centres open, yellow, one or more rows of guard petals; Decoratives—easily grown free-flowering doubles of moderate size; Large Flowered Exhibition (Japanese)—petals loosely arranged,

variously shaped. Compost, three parts fibrous loam, one part horse manure, one part decayed tree leaves, one part coarse silver sand, quarter-part finely ground bones, same of dissolved bones, one part charcoal, wood ashes and soot. Pot first time in 3-in. pots in March, second in 5 or 6-in. mid-April, third in 8- or 10-in. from middle to end of May. Stop main stems 4 in. from base in March to obtain bushy plants; those grown for exhibition blooms must be stopped according to variety (instructions are usually given in trade catalogues). Cut down plants intended for dwarfs to within 6 in. of pot in May. Thin flower buds to one on each shoot when size of radish seed. Stand plants in full sun May to Sept., then remove to greenhouse. Temp., while in bloom, 45° to 50°. Water freely while outdoors, moderately in greenhouse. Apply liquid manure from midsummer till flower buds show colour. Suitable liquid manures: two parts sulphate of ammonia, six parts superphosphate and one part sulphate of potash dissolved in water at the strength of $\frac{1}{2}$ oz. per gallon; one part nitrate of potash and two parts superphosphate, $\frac{1}{2}$ oz. per gallon; sheep and cow dung soaked in a sack in water till it is colour of weak tea; droppings from fowls or pigeons in weak solution. These mixtures should be alternated and applied every four or five days.

CULTURE OF OUTDOOR CHRYSANTHEMUMS: Soil, good ordinary. Position, sunny beds or borders. Plant out 3 ft. apart in May. Stop shoots when 6 in. high, disbud as for indoor varieties if large blooms are required. Water freely in summer. Give liquid manure July to Sept.

CULTURE OF HARDY PERENNIAL SPECIES: Soil, ordinary rich. Position, sunny borders. Plant, autumn or spring, *C. azaleanum*, *coreanum* and *rubellum* in spring. Lift, divide and replant every third year.

PROPAGATION: By cuttings in temp. 50° to 55° in Dec., Jan., Feb. or March for indoor and outdoor species; seeds in light soil in temp. 65° in March. After flowering, cut stems down and place plants in cold frame to produce cuttings, after which plant in garden or discard. Hardy perennial species: by division in March or seeds sown in warm greenhouse in Feb. or March. Marguerites by cuttings. Annuals by seed.

ANNUAL SPECIES CULTIVATED: *C. carinatum*, 'Tricolor Chrysanthemum', white, red, purple, yellow, disk purple, summer, 2 ft., N. Africa; *coronarium*, yellow and white, summer, 3 ft., S. Europe; *segetum*, 'Corn Marigold', yellow, summer, 18 in., Europe (Br.); *viscidi-hirtum*, yellow, summer, 1½ ft., N. Africa.

HARDY SPECIES CULTIVATED: *C. alpinum* (syn. *Leucanthemum alpinum*), white, summer, 3 to 6 in., Alps; *arcticum*, white tinged lilac, June to July, 1 ft., Arctic regions; *azaleanum*, cushion form, varied colours, double, July to Sept., 1 ft., hybrid; *cinerariifolium*, white, July to Aug., 1 to 2 ft., Dalmatia; *coccineum* (syn. *Pyrethrum roseum*), 'Pyrethrum', scarlet, summer, 2 to 3 ft., Caucasus; *hispanicum*, white, summer, 4 to 6 in., Spain, and var. *sulphureum*, yellow; *lacustre*, 'Marsh Oxeye', white, summer, 3 to 6 ft., S.W. Europe; *Leucanthemum*, 'Oxeye Daisy', white, summer, 2 ft., Europe; *maximum*, 'Shasta Daisy', white, summer, 1½ to 2 ft., Pyrenees, var. *laciniatum*, fringed ray-flowers; *nipponicum*, white, summer, 12 to 15 in., Japan; *Parthenium*, 'Feverfew', white, summer, 2 ft., Europe, var. *aureum*, 'Golden Feather'; *rubellum* (syn. *C. erubescens*), shades of lilac, pink, single, Sept. to Oct., 2 to 3 ft., China; *sibiricum* (syn. *C. coreanum*, *Leucanthemum sibiricum*), 'Korean Chrysanthemum', various, single and double, Sept. to Oct., 2 to 3 ft., Korea; *uliginosum*, 'Giant Daisy', white, autumn, 5 ft., E. Europe.

TENDER SPECIES CULTIVATED: *C. indicum*, 'Japanese Chrysanthemum', yellow, numerous in short-stemmed clusters, 2 to 3 ft., China; *frutescens*, 'Marguerite' or 'Paris Daisy', white or yellow, summer, 3 ft., Canary Is.; *mori-folium* (syn. *C. sinense*), 'Florist's Chrysanthemum', various, 2 to 4 ft., China and Japan.

Chrysocoma—Compositae. Greenhouse, evergreen flowering sub-shrub. First introduced early eighteenth century.

CULTURE: Compost, equal parts peat, loam and silver sand. Position, well-drained pots in sunny part of greenhouse. Pot, March. Water freely in spring

and summer, moderately other seasons. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 50°.

PROPAGATION: By cuttings of firm shoots in silver sand under bell-glass in spring.

SPECIES CULTIVATED: *C. coma-aurea*, yellow, July, 2 ft., S. Africa. See also Aster.

Chrysogonum—*Compositae*. Hardy herbaceous perennial.

CULTURE: Compost, equal parts loam, peat and leaf-mould. Position, sunny. Plant, Oct. or March.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *C. virginianum*, 'Golden Star', yellow, summer, 9 in., N. America.

Chrysophyllum—*Sapotaceae*. Stove evergreen tree. First introduced early eighteenth century.

CULTURE: Equal parts fibrous loam, leaf-mould and sand. Position, borders in warm greenhouse. Temp., March to Oct. 75° to 90°, Oct. to March 65° to 75°. Water freely during the summer months, sparingly in winter.

PROPAGATION: By cuttings of well-ripened wood in close frame and temp. 80°. Seeds sown in heat in Feb. or March.

SPECIES CULTIVATED: *C. Cainito*, 'Star Apple', 30 to 50 ft., light green or purple fruits, 2 to 4 in. in diameter, with white pulp, Trop. America; *macrophyllum*, large leaves clothed on the under-side when young with rich golden silky hairs, which gradually turn chestnut-brown, 40 to 50 ft., Sierra Leone.

Chrysopsis (Golden Aster)—*Compositae*. Hardy herbaceous perennial.

CULTURE: Soil, ordinary. Position, sunny borders.

PROPAGATION: By division of roots in March.

SPECIES CULTIVATED: *C. villosa*, golden yellow, July to Sept., 18 in., N. America.

Chrysosplenium (Golden Saxifrage; Water Carpet)—*Saxifragaceae*. Hardy perennial semi-aquatic herbs.

CULTURE: Soil, boggy peat or wet loam. Position, damp and shady water-courses or ditches. Plant, Oct. or March.

PROPAGATION: By division of plants in March.

SPECIES CULTIVATED: *C. alternifolium*, yellow, summer, 3 in., N. Hemisphere (Br.); *americanum*, purplish-yellow, summer, 3 in., N. America; *oppositifolium*, yellow, 3 in., Europe (Br.).

Chrysothamnus—*Compositae*. Evergreen sub-shrub. Formerly known as Bigelowia.

CULTURE: Soil, well drained. Position, warmest place available, not hardy in exposed situations. Transplant from pots in spring, fasten growths to wall, spreading well.

PROPAGATION: By cuttings of young growth in gentle bottom heat, pot singly and harden off, plunge in open for first summer, return to cool house for following winter and plant out the next spring.

SPECIES CULTIVATED: *C. graveolens* (syn. *Bigelowia graveolens*), yellow, Aug. to Sept., 6 to 8 ft., Western N. America.

Chufa, see *Cyperus esculentus*.

Chysis—*Orchidaceae*. Epiphytal, deciduous or semi-deciduous orchids. Pseudobulbs swollen, slender basally, 12 in. or more high. Leaves plicate. Flowers produced with the young growths.

CULTURE: Compost, as for Cattleya, pans suspended near glass, especially in autumn when full light is necessary. Winter temp. 60°. Rest decided. In summer water freely, temp. 70° to 80°. Repot as growth appears or just before.

PROPAGATION: By division of plants in Feb. or March.

SPECIES CULTIVATED: *C. aurea*, yellow and red, spring and summer, Venezuela; *bractescens*, white and yellow, very fragrant, spring, Mexico, Guatemala, Peru;

Chelsonii, yellow and purple, spring, 1 ft., hybrid; *laevis*, yellow-orange, lip yellow and crimson, spikes arched, summer, Mexico, Guatemala.

Cibotium—*Dicksoniaceae*. A small genus of stout tree ferns akin to *Dicksonias*. Very few are grown in Britain, they require great space and greenhouse temp. *C. Barometz* is sometimes grown for its historical interest and is useful in its juvenile stage.

CULTURE: Usual fern compost, will eventually occupy large pots or tubs. Temp., winter 45° to 50°, increasing in spring and summer, but with free ventilation. Syringe trunks (not fronds) daily during growing season. Reduce water in winter. Repot in spring as required.

PROPAGATION: By spores.

SPECIES CULTIVATED: *C. Barometz* (syn. *C. glaucescens*), 'Scythian Lamb', stout creeping rhizome, trunkless, fronds fragrant, China, Malay, etc.; *regale*, trunk 20 ft., fronds spreading 10 to 12 ft., Mexico; *Schiedei*, trunk 10 to 15 ft., fronds finely cut, 6 to 8 ft. long, Guatemala, Mexico.

Cichorium—*Compositae*. Salad vegetables, and chicory roots used for mixing with coffee.

CULTURE OF CHICORY: Soil, rich light. Position, open, away from trees. Sow seeds $\frac{1}{2}$ in. deep in drills 15 in. asunder first week in May. Thin seedlings when an inch high to 8 in. apart in row. No liquid or artificial manures required. Force crowns for salad by placing roots close together in large pots or deep box, using ordinary soil and covering with 8 in. sand. Temp. 60°. Cut whitloof or 'head' in about a fortnight.

CULTURE OF ENDIVE: Soil, light rich. Position, open garden or on south or west borders. Sow seeds $\frac{1}{4}$ in. deep in drills 18 in. apart in June for early crop, July for main crop, Aug. for late crop. Thin to 15 in. apart or sow more thickly and transplant. Water freely in dry weather. Blanch early crop in Aug., main crop in Sept., late crop in Oct. by covering each plant with inverted pot with drainage hole plugged, or taking inside to a dark shed or cellar. Lift remaining plants in Nov. and store close together in cold frame, covering them with dry leaves to ensure blanching.

SPECIES CULTIVATED: *C. Endivia*, 'Endive', blue, July, 2 ft., Orient; *Intybus*, 'French Endive', 'Chicory', blue, July, 2 ft., Britain.

Cigar Flower, see *Cuphea platycentra*.

Cimicifuga (Bugbane)—*Ranunculaceae*. Hardy herbaceous perennials. Introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, moist shady borders. Plant, Oct., Nov. or March.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light soil in cold frame in Sept.; division of roots in March.

SPECIES CULTIVATED: *C. americana*, white, Aug., 3 ft., N. America; *cordifolia*, white, July, 3 ft., N. America; *davurica*, white, July, 4 ft., China; *elata*, white, July, 3 ft., N. America; *racemosa*, 'Snake-root', white, Aug., 3 ft., N. America; *simplex*, white, Aug. to Oct., 3 ft., Kamchatka.

Cinchona (Quinine)—*Rubiaceae*. Greenhouse evergreen tree.

CULTURE: Compost, equal parts turfy loam and fibrous peat with a little sand and charcoal. Position, large pots or borders in heated greenhouse. Pot or plant, Oct. Water freely during growing season. Temp., March to Oct. 60° to 75°, Oct. to March 55° to 65°.

PROPAGATION: By cuttings of ripened wood under hand-light in temp. 75°.

SPECIES CULTIVATED: *C. officinalis*, rose, 20 to 40 ft., S. America, and its variety *condaminea*.

Cineraria, see *Senecio cruentus*.

Cinnamomum—*Lauraceae*. Stove evergreen trees and shrubs of interest on account of their economic value.

CULTURE: Compost, equal parts turfy loam and peat with a little sand. Position, large pots or borders in warm greenhouse. Water freely during growing season, and maintain a moist atmosphere. Temp., March to Oct. 70° to 80°, Oct. to March 60° to 70°.

PROPAGATION: By cuttings of young shoots in April placed in close frame and temp. 80°.

SPECIES CULTIVATED: *C. Camphora*, 'Camphor Tree', yellow, 30 to 40 ft., China and Japan; *Cassia*, 'Cassia Bark Tree', flowers small in silky panicles, 20 to 30 ft., China; *zeylanicum*, 'Cinnamon Tree', yellowish white, 20 to 30 ft., India, Malaya.

Cinnamon, see *Cinnamomum zeylanicum*; **-Fern**, see *Osmunda cinnamomea*; **-Rose**, see *Rosa cinnamomea*; **-Vine**, see *Dioscorea Batatas*.

Cinquefoil, see *Potentilla*.

Cirrhaea—*Orchidaceae*. Dwarf-growing epiphytes. Pseudo-bulbs small with a single leaf. Spikes pendent from base of pseudo-bulbs. Flowers inverted, segments narrow.

CULTURE: Compost, three parts of osmunda fibre cut fine, one and a half parts sphagnum moss. Winter temp. 60°, only occasional waterings. Summer, water freely, 70° and upwards. Expose to full light in autumn.

PROPAGATION: By division of plants if large enough in early spring.

SPECIES CULTIVATED: *C. dependens* (syns. *C. triste*, *C. Warreana*, *C. livida*, *C. purpurascens*), greenish, suffused and marked purple-red, very variable, summer, autumn, Brazil; *Loddigesii*, yellowish-green or greenish, purple spotted and barred, usually summer, Brazil; *obtusata*, yellowish-white, purple spotted, lip white, tipped violet, spring; *saccata* (syn. *C. fuscolutea*), yellow or yellowish-green, lip saccate, spring, Brazil.

Cirrhopetalum—*Orchidaceae*. A large epiphytic genus, chiefly Eastern, but extending to Africa, Madagascar and Brazil. Closely allied to *Bulbophyllum*. In many species the flowers form a circle or part of a circle, the lower sepals elongated, turned completely over and, except at their bases and tips, joined together. Tips of upper sepal and petals frequently ornamented with filaments or hair-like tufts. Lip small, fleshy, mobile.

CULTURE: As for *Bulbophyllum*.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection only—*C. appendiculatum*, flowers solitary, white and purple, tassels purple, lower sepals 6 in. long, late autumn, Bengal; *Amesianum*, old gold, single haired, lower sepals strawberry-red, various, Malaya, Philippines; *campanulatum*, yellow, lined brown-purple, fringed, lateral sepals rosy pink, deflexed, inflorescence small, pretty, Sumatra; *Collettii*, flowers 5, reddish with darker lines, tassels broad, lateral sepals 4 in. long, inflorescence fan-like, spring, summer, Burma; *Cumingii*, flowers 9 to 12, dark red, lateral sepals purplish, 1 in. long, various seasons, Philippines; *Makoyanum*, flowers, 10 or 12, circled, yellowish, lateral sepals 1½ in. long, clear yellow, so volute as to form a tube, winter, spring, Malaya; *Mastersianum*, flowers, 6 to 10, yellow, suffused with red-brown, lateral sepals drooped; *Medusae* (syn. *Bulbophyllum Medusae*), flowers many, inflorescence globular, creamy white, lateral sepals with 4 to 5 in. long threads, summer, autumn, Malaya; *miniaturum*, small, cinnabar-red, lateral sepals 2½ in. long, summer, autumn, Annam; *ornatissimum*, flowers about five, spreading fan-like, yellowish, suffused red-purplish-brown with darker stripes, lateral sepals 3 to 5 in. long, autumn, Himalaya, Assam; *picturatum*, flowers about 10, greenish-yellow, red spotted, upper sepal with a single purple-knobbed hair, lower 2 in. long, various seasons, Burma; *psittacoides* (syn. *C. gracillimum*), flowers several, circled, crimson-red, lateral sepals curved, thread-like, autumn, Siam, Malacca; *robustum*, flowers about 10, greenish-yellow, lower sepals shaded tawny-red, 2 to 2½ in. long, summer, autumn, New Guinea; *Rothschildianum*, flowers 5, spreading fan-like, greenish-yellow, lined and suffused with red, hairs

purple, lower sepals shading to purplish-red, 4 to 6 in. long, summer, various seasons, India; *refractum*, 'Windmill orchid', greenish, purplish, bristled, lower sepals yellowish, reddish lined, narrowly oblong, often deciduous, winter, Burma; *Wendlandianum*, resembles *C. Collettii*, smaller, early summer, Burma.

Cirsium (Plumed Thistle)—*Compositae*. Coarse prickly perennials, usually grown as biennials.

CULTURE: Soil, ordinary well drained. Position, sunny borders.

PROPAGATION: By seed in light soil in temp. 60° to 70° in Feb. or Sept.

SPECIES CULTIVATED: *C. Casabonae*, purple, summer, 2 to 3 ft., S. Europe; *Diacantha* (syn. *Chamaepeuce Diacantha*), 'Fishbone Thistle', purple, summer, leaves glabrous above, to 3 ft., Asia Minor; *muticum*, 'Swamp Thistle', pink, 2 ft., summer, Medit.; *spinosissimum*, yellow, summer, 3 ft., Europe.

Cissus—*Vitaceae*. Stove and greenhouse evergreen climbers.

CULTURE: Compost, turfy peat, loam, leaf-mould and sharp sand. Position, pots or borders in greenhouse. Temp. for *C. discolor*, March to Oct. 75° to 85°, Oct. to March 65° to 75°. Others in a cool greenhouse.

PROPAGATION: By cuttings of young growth 2 in. long with heel of old wood, inserted in sandy soil under hand-glass in temp. 80°.

SPECIES CULTIVATED: *C. antarctica* (syn. *Vitis antarctica*), climbing shrub, Australia; *discolor*, strong climber, leaves velvety green mottled with white, stems coral, Java; *gongylodes* (syn. *C. pterophora*), green and red rope-like leafy branches with a terminal tuber, Brazil; *incisa* (syn. *Vitis incisa*), 'Marine Ivy', long fleshy climber, U.S.A. See also *Rhoiocissus*, *Vitis*.

Cistus (Rock Rose)—*Cistaceae*. Hardy and half-hardy evergreen shrubs, mostly natives of S. Europe, but many are of garden origin. First introduced mid-sixteenth century.

CULTURE: Hardy kinds in any soil but for preference all should have light well-drained soil and reasonably sheltered positions. They are good rock-garden shrubs. No pruning except removal of dead portions following severe winter.

PROPAGATION: By seeds in sandy soil in frame or unheated greenhouse in March, transplanting seedlings into small pots and planting outdoors in June; by cuttings 4 in. long in pots of sandy soil in Sept. in cold frame or greenhouse.

SPECIES CULTIVATED: *C. Aguilare*, white, brown blotches, 6 ft., strong, hybrid; *albidus*, rosy lilac, 5 ft., hardy; *corbariensis*, 3 ft., white, hardy; *crispus*, rosy red, 2 ft., comparatively hardy; *cyprius*, 'Gum Cistus', chocolate blotches, 6 ft., hardy; *florentinus*, white, 3 ft., hybrid; *ladaniferus*, white, crimson blotches, 4 ft., *laurifolius*, hardiest white, 6 ft.; *lusitanicus*, white, carmine blotches, 3 ft., spreading; *Palinhaii*, white, June, 18 in., Portugal; *populifolius*, white, to 6 ft., var. *lasiocalyx*, pure white, 3 ft., hardy; *purpureus*, reddish purple, chocolate blotches, rather tender, 3 ft., var. Silver Pink, hardy, bright pink; *salvifolius*, white, 2 ft.; *Skanbergii*, almond pink, 4 ft., hybrid.

Citron, see *Citrus medica*; **-scented Geranium**, see *Pelargonium citriodorum*; **-scented Orchid**, see *Odontoglossum citrosum*.

Citrullus—*Cucurbitaceae*. Tender climbing plant cultivated for its edible fruits. Requires a long warm season. Rarely grown in England.

CULTURE: As for ordinary melon (*Cucumis melo*) except that shoots should not be pinched.

SPECIES CULTIVATED: *C. vulgaris*, 'Water Melon', Trop. and S. Africa, var. *citroides*, citron or preserving melon.

Citrus—*Rutaceae*. Sub-tropical, evergreen shrubs with fragrant flowers and thick-skinned, juicy, edible fruits. Introduced here in the sixteenth century. See also *Fortunella*, *Aegle*, *Poncirus*.

CULTURE OF GREENHOUSE FRUITING PLANTS: Choose a lofty, well-lighted and well-ventilated greenhouse where the winter temp. can be maintained between

40° and 50°. Compost of equal parts turfy loam and well-rotted leaf-mould with a little burnt earth and charcoal added. Growth made early in the year; repot after the growth has been made. Position, in borders or in well-drained tubs or large pots. Syringe daily during the summer. Water each week Aug. to Dec. with soot water and never allow trees to become dry at the roots. Cut out any weak shoots and bare wood during the winter before growth begins. Fruits set in the spring do not ripen until the following season.

CULTURE OF DECORATIVE POT PLANTS: Seedling Citrus species make useful room plants with decorative, tough, leathery leaves that can survive a room atmosphere. *C. Limonia* and *C. taitensis* are suitable compact species. Use a standard potting compost. Put outside in summer so that the wood ripens thoroughly.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 55° in March for producing stocks on which to graft choice kinds; cuttings inserted in small pots of sandy soil in July; layering in Oct.; budding in Aug.; grafting in March.

SPECIES CULTIVATED: *C. aurantifolia*, 'Lime', to 10 ft., fruit thin-skinned, green, very acid, India; *Aurantium*, 'Sour or Seville Orange', 20 ft., fruit loose skinned, orange, sour, with hollow core when ripe, Cochin-China, var. *myrtifolia*, short-jointed, narrow-leaved form useful as a pot plant; *Limonia*, 'Lemon', to 15 ft. fruit thin skinned, pale yellow, oblong with terminal nipple, very sour, Asia; *maxima*, 'Shaddock', 'Pummelo', 15 to 30 ft., rind bitter, greenish-yellow, large, round, Malaya; *medica*, 'Citron', 10 ft., fruit oval, 6 to 10 in. long, warty with scant acid pulp, used for candied peel, Asia; *nobilis*, var. *deliciosa*, 'Mandarin' and 'Tangerine', to 15 ft., fruit yellow or orange with loose peel and easily divided flesh, Cochin-China; *paradisi*, 'Grapefruit', to 30 ft., fruit large, yellow, borne in clusters; *sinensis*, 'Common or Sweet Orange', 15 ft., fruit orange, oval, with solid core and sweet pulp, China; *taitensis*, 'Otaheite Orange', flowers pink outside, fragrant, fruit small, yellow, lemon shaped, sometimes grown as a pot plant, origin unknown.

Cladrastis (Yellow-wood)—*Leguminosae*. Hardy deciduous flowering shrubs. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open shrubberies, or singly on lawns. Plant, Oct. to Feb.

PROPAGATION: By seeds sown 1 in. deep in ordinary soil outdoors in March; cuttings of root inserted outdoors in spring.

SPECIES CULTIVATED: *lutea* (syn. *C. tinctoria*), white, July, 15 ft., United States; *C. sinensis*, blush-white, July, 40 to 60 ft., China. See also Maackia.

Clarkia—*Onagraceae*. Hardy annuals. First introduced early nineteenth century.

CULTURE: Soil, light, rich. Position, sunny borders or beds. Sow seeds $\frac{1}{4}$ in. deep in April, May or June in rows or masses where plants are required to flower. Thin seedlings to 8 in. apart when 3 in. high. May be grown as a pot plant if sown in Sept., placed in small pots and grown in cool, airy conditions till spring. Pot on into loamy soil as required.

SPECIES CULTIVATED: *C. Breweri* (syn. *Eucharidum Breweri*), white, lilac and purple, summer, 8 in., California; *concinna*, purple, summer, 1 ft., California; *elegans*, rosy purple, July, 1 to 4 ft.; *pulchella*, various colours, single and double, 1 to 1½ ft. Numerous superior vars. described in trade lists, ranging in colour from purest white, through various tones of rose, pink, coral, to brilliant scarlet and crimson.

Clary, see *Salvia Sclarea*.

Claytonia (Spring Beauty)—*Portulacaceae*. Little spring-blooming perennials. Some annual plants formerly included in this genus have been transferred to *Montia*. First introduced mid-eighteenth century.

CULTURE: Soil, damp, peat or bog. Position, rockery or moist, shady borders. Plant, Oct. or March.

PROPAGATION: By seed; offsets.

SPECIES CULTIVATED: *C. australasica*, white, creeping, summer, Australia, New Zealand; *caroliniana*, pink, May, 6 in., N. America; *virginica*, white, April, 6 in., N. America.

Clematis (Virgin's Bower)—*Ranunculaceae*. Greenhouse and hardy climbers and herbaceous perennials, deciduous or evergreen. The most valuable kinds for garden cultivation will be found amongst the named vars. and hybrids; it is important to remember to which class each belongs so that it may be correctly pruned.

CULTURE OF HARDY CLIMBING SPECIES: Soil, rich, deep, well-drained loam containing plenty of old mortar and decayed manure. Position, sunny trellises, arches, old tree stumps, arbours, etc., also in beds with shoots trained over surface. Plant in autumn or spring. Plant so that roots are shaded but train shoots out into the sun. Mulch liberally every spring with rich compost or old manure. Pruning: *C. montana*, *alpina*, *Flammula*, *Armandii*, *paniculata* and *tangutica* should have sufficient old growth removed to keep them within bounds; this should be done as soon as the flowers fade. *C. florida* and *C. patens* groups should be lightly thinned in Feb. *C. lanuginosa*, *Jackmanii* and *Viticella* groups should be pruned severely in Feb., either cutting the whole plant back to within a foot or so of the ground or else pruning each young growth to within one pair of buds of its base. *C. crispa*, *integrifolia*, *Pitcheri* and *Viorna* should have all growth that has been damaged by frost removed in Feb.

CULTURE IN POTS: Compost, two parts loam, one part of equal proportions of leaf-mould, decayed manure and sand. Plant in pots or tubs in spring. Train shoots up roof of cold or cool greenhouse or around wire trellis fixed in pots. Water freely March to Sept. Apply weak liquid manure occasionally in summer. Keep soil nearly dry in winter. Prune shoots to 3 or 4 in. from base early in the year.

CULTURE OF GREENHOUSE SPECIES: Compost, as above. Grow in pots or well-drained bed, planting in spring. Water freely during the summer, moderately in winter. Prune away weak growths and shorten rampant ones a little in Feb. Train shoots near roof. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°. Syringe freely daily in summer.

CULTURE OF HERBACEOUS SPECIES: Soil, ordinary, rich. Position, sunny borders. Plant in autumn or spring. Top-dress in autumn with decayed manure. Prune shoots close to soil in autumn. Dwarf species best grown on sunny rockeries.

PROPAGATION: By seeds in cold frame in spring for hardy kinds, in heat in spring for greenhouse species, also by cuttings in temp. 75° in spring. Hardy climbers by grafting on roots of *C. Viticella* or *C. Vitalba* in heat in spring; layering shoots in summer; herbaceous kinds by division in autumn or cuttings of young shoots in frame in summer.

GREENHOUSE SPECIES CULTIVATED: *C. indivisa*, white, April, 15 to 20 ft., New Zealand, and var. *lobata*.

HARDY CLIMBING SPECIES CULTIVATED: *C. alpina*, 6 ft., blue, Europe; *Armandii*, vigorous evergreen, to 25 ft., white, China; *campaniflora*, vigorous, to 20 ft., lilac, small flowers in great profusion, Portugal; *Fargesii*, to 20 ft., white, China, and var. *Souliei*; *Flammula*, summer flowering, white, fragrant, Medit. area; *Jouiniana*, vigorous summer flowering with clusters of small bell-shaped flowers; *macropetala*, violet blue, 8 ft., May, China; *montana*, climber to 20 ft., white, May, Himalaya, and vars. *rubens*, clear pink, *Wilsonii*, later flowering; *orientalis*, 10 ft., yellow, slightly fragrant, Persia; *Rehderiana*, pale yellow, fragrant, China; *tangutica*, to 10 ft., yellow, N. China, var. *obtusiuscula*, yellow; *vedrariensis*, pale rose, hybrid; *Vitalba*, 'Traveller's Joy', 'Old Man's Beard', to 30 ft., greenish-white, Europe, etc.; *Viticella*, to 12 ft., blue, purple or rose-purple, S. Europe, Asia, vars. *alba*, white, *caerulea*, blue, *kermesina*, wine red.

HERBACEOUS SPECIES CULTIVATED: *C. Fremontii*, purple, summer, 1 ft., N. America; *heracleifolia* (syn. *C. tubulosa*), purple, summer, 2 ft., China, var. *Davidiana*, lavender-blue, fragrant; *integrifolia*, blue, Aug., 2 ft., S. Europe;

ochroleuca, yellow, summer, 2 ft., N. America; *recta*, white, fragrant, Aug., 2 ft., S. Europe; *stans*, white, Aug. to Sept., sometimes woody at base, Japan.

Clematoclethra—*Actinidiaceae*. Deciduous climbing shrubs.

SPECIES CULTIVATED: *C. actinidioides*, white to 20 ft., summer, W. China.

Clematopsis—*Ranunculaceae*. Half-hardy herbaceous perennials.

CULTURE: Good deep loam and full sun in large rock-garden or border.

PROPAGATION: By seeds sown as soon as ripe.

SPECIES CULTIVATED: *C. Stanleyi*, pink, 2 ft., summer, S. Africa.

Cleome—*Capparidaceae*. Stove annual. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, pots in sunny stove. Water moderately at all times. Temp., 65° to 75°. Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 70° in March, transplanting seedlings into pots when 1 in. high.

SPECIES CULTIVATED: *C. spinosa* (syns. *C. pungens* and *C. gigantea*), 'Spider Flower', rose-purple or white, summer, 3 to 4 ft., Trop. America.

Clerodendron—*Verbenaceae*. Stove climbing and hardy flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould, decayed manure and silver sand. Pot, Feb. Prune shoots after flowering to within 2 or 3 in. of their base. Water freely March to Sept., moderately Sept. to Nov., after which keep dry. Temp., Oct. to Feb. 55° to 60°, Feb. to Oct. 65° to 85°. Plant hardy species in ordinary soil in sheltered, warm corners outdoors in Oct. or Nov.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in temp. 75° in March; cuttings of stems or shoots 3 in. long, inserted in sandy compost in temp. 70° to 75° in Jan., Feb. or March.

STOVE SPECIES CULTIVATED: *C. fragrans*, 'Glory Tree', white or blush, autumn, 6 ft., China; *myrmecophilum*, orange, 4 ft., Singapore; *speciosissimum* (syn. *C. fallax*), scarlet, Aug., 2 to 4 ft., Java; *speciosum*, dull red, summer, 10 ft., hybrid; *splendens*, scarlet, summer, 10 ft., Trop. Africa; *Thomsoniae* (syn. *C. Balfouri*), crimson, summer, 6 ft., Trop. Africa, and vars. *variegatum* and *magnificum*.

HARDY SPECIES CULTIVATED: *C. Bungei* (syn. *C. foetidum*), rose, Aug., 5 ft., China; *trichotomum*, white and red, summer, 10 to 12 ft., Japan, and var. *Fargesii*, white.

Clethra 'White Alder',—*Ericaceae*. Hardy and tender evergreen and deciduous flowering shrubs. First introduced early eighteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Position, front of shrubberies. Plant, Nov. to Feb.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep outdoors in March, or in boxes of light soil in temp. 55° in Feb.; cuttings inserted in sandy soil in gentle heat in Aug.; layering in Oct. *C. alnifolia* suitable for forcing to flower in winter.

SPECIES CULTIVATED: *C. alnifolia*, 'Sweet Pepper Bush', white, Aug., 8 to 9 ft., Florida, var. *paniculata*, 4 ft., the hardiest; *acuminata*, white, Sept., 10 to 20 ft. Cent. U.S.A.; *barbinervis* (syn. *C. canescens*), white, Aug. 30 ft., China; *tomentosa*, white, Sept., 6 to 8 ft., South-eastern U.S.A.

Cleyera—*Theaceae* (or *Ternstroemiaceae*). Tender evergreen shrubs or small trees.

CULTURE: As for *Eurya*.

PROPAGATION: As for *Eurya*.

SPECIES CULTIVATED: *C. japonica* (syn. *Eurya ochracea*), creamy white, Japan, China.

Clanthus—*Leguminosae*. Greenhouse and half-hardy evergreen climbing shrubs or herbaceous perennials. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part peat or leaf-mould with sharp sand, broken brick and charcoal added. Position, sunny greenhouse, in a

well-drained border, pots or hanging baskets. Pot, spring. Water carefully Oct. to March, moderately March to Oct.

PROPAGATION: By seeds sown in sandy soil in temp. 65° to 70° . Cuttings of side-shoots in sand with bottom heat. *C. Dampieri* does not thrive readily on its own roots, and is best grafted in the seedling state on to seedling stocks of *Colutea arborescens*, the latter being raised about ten days in advance of the seedling *Clianthus*, and established singly in small pots before grafting. Grafted plants are placed under a bell-glass in temp. 65° to 70° until union is complete and growth commences, after which they should gradually be inured to cooler conditions.

SPECIES CULTIVATED: *C. Dampieri*, 'Glory Pea', red with black blotch, 2 to 3 ft., summer, Australia; *punicus*, 'Parrot's Bill', 'Red Kowhai', scarlet, lobster-claw flowers and fern-like foliage, handsome, 3 to 6 ft., summer, New Zealand, and vars. *albus*, creamy-white, *roseus*, rosy-pink, and *magnificus*, a large form of the type species.

Cliff Brake, Fern see *Pellaea*.

Climbing Dahlia (*Hidalgoa Wercklei*); **-Fern** (*Lygodium scandens*); **-Fumitory** (*Adlumia fungosa*); **-Groundsel** (*Senecio scandens*); **-Hempweed** (*Mikania scandens*); **-Hydrangea** (*Schizophragma hydrangeoides*).

Clinopodium—*Labiatae*. Shrubs or herbs of the N. Temp. Zone. Some authors include this genus in *Satureja*.

CULTURE: Soil, ordinary. Position, sunny borders. Plant, Oct. or April.

PROPAGATION: By cuttings; division.

SPECIES CULTIVATED: *C. coccineum* (syn. *Satureja coccinea*), scarlet, to 3 ft., N. America; *dentatum*, white or purplish, to $2\frac{1}{2}$ ft., N. America; *georgianum* (syn. *C. carolinianum*), white to pinkish-purple, to 2 ft., N. America.

Clintonia—*Liliaceae*. Hardy perennial herbs spreading by underground rhizomes.

CULTURE: Soil, sandy peat. Position, moist shady border. Plant, Oct. or March.

PROPAGATION: By division of roots in spring.

SPECIES CULTIVATED: *C. Andrewsiana*, rose-purple, April, berries blue, $1\frac{1}{2}$ ft., California; *borealis*, yellow, May, berries blue, 1 ft., E.N. America; *umbellata*, white, spotted purple, May, berries black, 1 ft., N. America. Two plants sometimes known as *Clintonia* are properly *Downingia elegans* and *D. pulchella*.

Clitoria (Butterfly Pea)—*Leguminosae*. Stove evergreen flowering climber. First introduced early eighteenth century.

CULTURE: Compost, equal parts peat, leaf-mould, loam and silver sand. Position, pots, tubs, or beds in light plant stove. Pot or plant, March. Water freely April to Sept., moderately afterwards. Temp., Oct. to March 55° to 65° , March to Oct. 70° to 80° .

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in light soil in temp. 75° in March; cuttings of side shoots inserted in sandy peat in temp. 80° at any time.

SPECIES CULTIVATED: *C. heterophylla*, blue, July, 2 ft., Tropics; *ternatea*, blue, July, 10 to 12 ft., E. Indies. See also *Centrosema*.

Clivia (Kafir Lily)—*Amaryllidaceae*. Greenhouse evergreen flowering plants. Fleshy rooted. Formerly known by the generic name of *Imantophyllum*. First introduced early nineteenth century.

CULTURE: Compost, two-thirds good loam, one-third decayed manure and sand. Position, sunny, close to glass in greenhouse. Pot, Feb. Water freely March to Sept., moderately other times. Temp., March to Sept. 60° to 65° , Sept. to March 45° to 55° .

PROPAGATION: By seeds sown in light soil in temp. 75° in March; division of roots at potting time.

SPECIES CULTIVATED: *C. cyrtanthiflora*, orange, winter and early spring, hybrid; *Gardenii*, orange-yellow, Dec. to Feb., 18 in., S. Africa; *kewensis*, canary-yellow,

spring, 2 ft., hybrid; *miniata*, scarlet and yellow, spring and early summer, 1 to 1½ ft., Natal; *nobilis*, red and yellow, May to July, 1 to 1½ ft., S. Africa. There are numerous vars. of *C. miniata* which are superior to the parent species.

Clove Pink or Gilliflower, see *Dianthus Caryophyllus*; **-Tree**, see *Eugenia aromatica*.

Clover, see *Trifolium*.

Club Lily, see *Kniphofia*; **-Moss**, see *Lycopodium clavatum*; **-Rush**, see *Scirpus*.

Cluster Pine, see *Pinus Pinaster*.

Clytostoma (Trumpet-flower)—*Bignoniaceae*. Greenhouse climbing plants, formerly included in the genus *Bignonia*. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part peat, or leaf-soil and silver sand. Pot, Feb. to April. Position, sunny greenhouse, in bed or border with good drainage, but root production must be restricted to 3 ft. square for one plant. Prune away one-third of strong shoots and two-thirds of weak shoots in February. Water freely April to Sept., very little at other times. Shade is not necessary. Temp., Oct. to March 50° to 55°, March to Oct. 55° to 65°.

PROPAGATION: By cuttings of young shoots 3 in. long inserted in well-drained pots of sandy soil in temp. 65° to 70° in April.

SPECIES CULTIVATED: *C. binatum* (syn. *Bignonia purpurea*), mauve, May to June, 10 ft., Uruguay; *callistegioides* (syn. *Bignonia speciosa*), lavender, May, 10 to 15 ft., Brazil, Argentine.

Cnicus—*Compositae*. Thistle-like annual.

CULTURE: Soil, ordinary. Position, rock or wild garden, preferably sunny.

PROPAGATION: By seed.

SPECIES CULTIVATED: *C. benedictus*, 'Blessed Thistle', yellow, 1½ to 2 ft., Britain, Medit. Region and Caucasus.

Cobaea—*Polemoniaceae*. Greenhouse and half-hardy climbing perennial, usually grown as an annual. First introduced late eighteenth century.

CULTURE: Compost, mainly loam, with small additions of leaf-mould and silver sand. Position, pots or beds in greenhouse, or against south or south-west walls, arches or trellises outdoors in summer. Pot, March. Plant outdoors in June. Temp., Sept. to March 50° to 55°, March to Sept. 60° to 70°. Water freely in summer, moderately other times.

PROPAGATION: Ordinary species by seeds sown ¼ in. deep in light soil in temp. 60° to 65° in March; variegated species by cuttings of young side shoots inserted in sandy peat in temp. 65° in March or April.

SPECIES CULTIVATED: *C. scandens*, 'Cups and Saucers', purple, summer, 10 to 30 ft., Mexico, var. *aureo-marginata*, leaves variegated with yellow.

Cobnut, see *Corylus Avellana*.

Cobweb Houseleek, see *Sempervivum arachnoideum*.

Cochlioda—*Orchidaceae*. A small epiphytic genus. Differing from *Odonoglossum* chiefly by two stigmatic surfaces. Species cross with *Odontoglossum*, *Oncidium*, *Miltonia*, etc. *C. Noezliana* has been of great value to the hybridist and is responsible for the brilliant colours in *Odontiodas*. Habit that of an *Odontoglossum*, usually darker.

CULTURE: Compost, temps., etc., as for *Odontoglossums*.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: *O. Noezliana*, brilliant orange-scarlet, winter, spring, Peru; *rosea* (syn. *Odontoglossum roseum*), rose-carmine, winter and spring, Peru; *sanguinea* (syn. *Mesospinidium sanguineum*), rose-pink, scape often branched, autumn, Ecuador; *vulcanica* (syn. *Mesospinidium vulcanicum*), dark rose-red to purplish, autumn, spring, Peru.

Cockscomb, see *Celosia cristata*.

Cocksfoot Grass, see *Dactylis*.

Cocoa Tree, see *Theobroma Cacao*.

Coconut Palm, see *Cocos nucifera*.

Cocos—*Palmae*. Stove palm producing the coconut of commerce. First introduced late seventeenth century. Some species formerly included in the genus have been transferred to *Arecastrum*.

CULTURE: Compost, two parts loam, equal parts peat and sand. Position, pots in shady stove. Pot, March. Water freely March to Oct, moderately at other times. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 70°.

PROPAGATION: By seeds sown 1 in. deep in light soil in temp. 85° at any time.

SPECIES CULTIVATED: *C. nucifera*, 'Coconut Palm', 40 to 100 ft., Tropics.

Codiaeum (Croton)—*Euphorbiaceae*. Stove evergreen shrubs grown extensively in hothouses for their coloured ornamental foliage. First introduced early nineteenth century.

CULTURE: Compost, two parts rich loam, one part peat and sand. Position, pots in stove close to the glass. Pot, March. Water freely March to Sept., moderately afterwards. Temp., Oct. to March 55° to 65°, March to Oct. 70° to 85°.

PROPAGATION: By cuttings of the ends of shoots inserted singly in 2 in. pots filled with sandy soil in temp. 75° at any time; stem-rooting in March or April.

SPECIES CULTIVATED: *C. variegatum*, leaves yellow and green, 3 to 10 ft., Malaya, and many vars. including *Andreanum*, broad yellow leaves, *Bergmanii*, broad creamy-yellow leaves blotched with green, *Chelsonii*, orange, red and crimson, *Evansianum*, green, yellow, crimson and scarlet, *Hawkeri*, creamy white and green, *illustre*, green and yellow, *interruptum*, yellow with red midrib, *Johannis*, green and yellow, *Laingii*, green, red and salmon, *picturatum*, green, yellow and red, *tricolor*, green, golden yellow and cream, *Warrenii*, green and orange-carmine, *Williamsii*, green, crimson and magenta, *Weismannii*, green, crimson and magenta.

Codlins and Cream, see *Epilobium hirsutum* and *Narcissus incomparabilis*.

Codonopsis—*Campanulaceae*. Hardy perennial herbs.

CULTURE: Soil, ordinary good. Position, sunny borders. Plant, autumn or spring.

PROPAGATION: By seeds sown in cold frame in spring, planting out seedlings in June; cuttings in autumn.

SPECIES CULTIVATED: *C. Bulleyana*, pale blue, June, 6 in., Tibet, Yunnan; *clematidea* (syn. *Glossocomia clematidea*), white and blue, summer, 3 ft., Cent. W. Asia; *convolvulaceae*, light lavender, climber, China to Upper Burma, var. *Forrestii* (syn. *C. tibetica*), larger flowers; *meleagris*, greenish-white outside, dull purple inside, May to June, semi-climbing, Yunnan; *mollis*, bluish-lavender, 3 ft., S. Tibet; *ovata*, blue, summer, 1 ft., Himalaya; *rotundifolia*, blue and yellow, July to Aug., 1½ ft., W. Himalaya; *Tangshen*, blue, June, semi-climbing, China; *vinciflora*, lilac, climber, Szechwan, Tibet, Himalaya; *viridiflora*, greenish-blue, summer, semi-climbing, E. Asia.

Coelia—*Orchidaceae*. A small epiphytic genus. Pseudo-bulbs globose, clustered. Flowers from their base in short, erect, bracteate spikes, small, usually densely set.

CULTURE: Temps. and compost as for *Lycastes*, but the winter rest less severe.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *C. bella*, flowers few, large, creamy-white, magenta tipped, autumn, winter, Mexico; *macrostachya*, rose-red, height 12 to 18 in., C. America; *triptera* (syn. *C. Baueriana*), greenish-white, fragrant, summer, Mexico.

Coelogyne—*Orchidaceae*. A large epiphytic genus. Species vary greatly, small to large. Flowers solitary in some, many in others. The petals filiform in some, the lip usually crested. Spikes usually produced from the centres of the new growths, in some as the pseudo-bulbs mature.

CULTURE: Compost, three parts of cut osmunda fibre and one part, or more,

sphagnum moss. Pans for the smaller growing, pots for the stronger. Baskets for those with long hanging spikes.

PROPAGATION: By division of the plants when repotting in spring. All temp. should rise higher in the summer.

SPECIES CULTIVATED: A selection only. Species requiring a decided rest and winter temp. about 50° or lower on occasion. *C. corymbosa*, white, lip white, yellow, red-marked, summer, N. India; *Mossiae*, white, lip yellow-marked, spring, Nilgiri Hills, S. India; *nervosa*, white, orange-brown keels on lip, summer, N. India; *nitida* (syn. *C. ocellata*), white, with yellow, red-margined spots in lip, spring, N. India; *ochracea*, very similar, pseudo-bulbs nearly oblong, spring, Khasia; *odoratissima*, white, lip with lemon-yellow stains, small, fragrant, early summer, Nilgiri.

Species requiring a winter temperature of 55° to 60° and more frequent watering: *C. barbata*, white, lip with brown-black hairs, winter, Assam; *cristata*, flowers pendent, white with 5 yellow keels on lip, fragrant, Feb. to April, Himalaya; *fuliginosa*, flowers 1 to 3, whitish, suffused reddish-brown, lip with blackish hairs, requires a raft, early winter, Himalaya, etc.; *Gardneriana* (syn. *Neogyne Gardneriana*), flowers pendent, white, winter, Nepal; *Lawrenceana*, flowers 1 to 2, large, tawny yellow, lip orange, sienna-brown, white, spike erect, early spring, Indo-China; *Mooreana*, large, white, with yellow hairs on lip, spring or autumn, Annam; *pulchella*, small, several, white, lip white, chocolate brown and black-brown, spring.

The following should have a winter temp. of 60° to 65°: *C. lentiginosa*, small, yellow, red-brown, orange-brown, summer, Burma; *Massangeana*, yellowish brown and chocolate brown, various, Malaya, Java; *Micholitzii*, curious, white, lip with a large, raised, corrugated, chocolate-brown process, summer, New Guinea; *Sanderiana*, white, and yellow, large, spring, Sunda Isles; *speciosa*, tawny-brown, lip yellow, white, blackish-brown with crested keels, various seasons, Malaya, Java.

For the following, winter temp. should be 70° and a moist atmosphere is needed: *C. asperata*, whitish, lip yellowish, red-brown and orange, spring, summer, Borneo, E. Indies; *Dayana*, ochre-yellow, lip white and brown, spikes pendent, long, spring, summer, Borneo; *Mayeriana*, flowers 3 to 5, green, lip with blackish markings, suitable for a tree-fern stem, late summer, Singapore; *pandurata*, large, green, lip with blackish asperities and toothed keels, place on raft, various seasons, Borneo; *tomentosa*, orange-red or brown-orange, lip shaded with white, spikes pendent, redly tomentose, summer, Borneo, Malaya; *Veitchii*, white, summer, New Guinea.

Coffea (Coffee Tree)—*Rubiaceae*. Stove evergreen shrubs. Fruit, a small reddish, fleshy berry, containing two seeds enclosed in parchment-like shell which are the 'coffee beans' of commerce. First introduced late seventeenth century.

CULTURE: Compost, two parts turfy loam, one part leaf-mould and sand. Position, pots in moist plant stove. Pot, March. Temp., March to Sept. 75° to 85°, Sept. to March 60° to 70°. Water freely in summer, moderately other times.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 85° in March; cuttings of firm shoots inserted in sandy soil under bell-glass in temp. 85° in summer.

SPECIES CULTIVATED: *C. arabica*, 'Arabian Coffee', white, fragrant, Sept., 10 to 15 ft., Arabia; *hybrida*, 'Tampis Coffee', hybrid; *liberica*, 'Liberian Coffee', white, fragrant, 15 to 20 ft., Trop. Africa.

Coffee Tree, see *Coffea*.

Coix—*Gramineae*. Half-hardy ornamental flowering annual grass. First introduced late sixteenth century.

CULTURE: Soil, light, rich. Position, sunny border outdoors.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 55° to 60° in March, transplanting seedlings outdoors in May; or similar depth outdoors in April where plants are to flower.

SPECIES CULTIVATED: *C. Lacryma-Jobi*, 'Job's Tears', 2 to 3 ft., grey pearly seeds chief attraction, Trop. Asia, var. *aurea zebrina*, variegated form.

Colchicum (Autumn Crocus)—*Liliaceae*. Hardy bulbous flowering plants.

CULTURE: Soil, light sandy loam, enriched with decayed manure or leaf-mould. Position, moist beds or rockeries, shrubbery borders, or lawns near shade of trees. Plant bulbs 3 in. deep and 3 in. apart in July or Aug. Foliage dies down in June and July, and does not reappear until after plant has flowered.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in bed of fine soil outdoors in Aug. or Sept., or in pans or boxes of similar soil in cold frame at same time, transplanting seedlings 3 in. apart when two years old; division of bulbs in Aug. Seedling bulbs do not flower until four or five years old.

SPECIES CULTIVATED: *C. agrippinum*, rose-purple and white, autumn, 3 to 4 in., S. Europe; *atropurpureum*, purplish-red, autumn, 3 to 4 in., Europe; *autumnale*, 'Meadow Saffron', purple, Sept., 8 in., Europe (Britain), and numerous vars.; *Bornmuelleri* (syn. *C. speciosum* var. *giganteum*), rosy lilac, 8 to 12 in., Asia Minor; *byzantinum*, rose and purple, Sept., 6 in., Greece; *Decaisnei*, pale rose, Oct. to Nov., Mt. Lebanon; *giganteum*, soft rose and white, autumn, hybrid; *speciosum*, lilac-purple, Sept., Caucasus, and var. *album*, white; *variegatum*, rose and purple, Sept., 6 in., E. Europe and Asia Minor.

Coleus—*Labiatae*. Stove perennials with ornamental foliage. First introduced mid-eighteenth century.

CULTURE: Compost, two parts turfy loam, one part well-decayed manure, leaf-mould and little sand. Position, pots in stove in winter, greenhouse in summer. Pot, Feb. or March, pressing soil firmly in pots. Temp., Sept. to March 60° to 70°, March to June 75° to 85°, June to Sept. 65° to 75°. Water very moderately Sept. to March, freely afterwards. Ornamental-leaved kinds require to have points of their shoots pinched off in early stage of their growth to ensure dwarf or well-shaped plants.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light soil in temp. 75° in Feb., March or April; cuttings of young shoots inserted in light soil or coconut-fibre refuse at any time; grafting in spring.

SPECIES CULTIVATED: *C. Autranii*, lavender, winter-flowering, 3 ft., Abyssinia; *barbatus*, blue, 1 to 2 ft., India, Africa; *Blumei*, white and purple, leaves bronzed, 1 to 3 ft., Java, and var. *Verschaffeltii*, *Frederici*, purplish-blue, winter-flowering, 1½ to 2 ft., Angola; *thyrsoides*, 'Winter-flowering Coleus', blue, Jan. to April, 3 ft., Trop. Africa.

Colletia—*Rhamnaceae*. Half-hardy evergreen shrubs. Branches armed with formidable spines. First introduced early nineteenth century.

CULTURE: Soil, loamy. Position, sheltered, well-drained borders in S. of England. Plant in Oct.

PROPAGATION: By cuttings of firm shoots 6 in. long, inserted in well-drained pots of sandy soil in cold frame in Aug. or Sept.

SPECIES CULTIVATED: *C. armata*, white, Sept., bodkin-like spines, 10 ft., Chile; *cruciata*, 'Anchor Plant', white, autumn, flattish, triangular spines, occasionally bodkin-like, 4 to 10 ft., Uruguay; *infausta* (syn. *C. horrida*), white, March, bodkin-like spines, 10 ft., Peru.

Collinsia—*Scrophulariaceae*. Hardy annuals. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open beds or borders. One of the easiest of all annuals to grow.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in Sept., March or April where plants are required to flower. Thin seedlings to 6 in. apart when 2 in. high.

SPECIES CULTIVATED: *C. bartsiiifolia*, white, marked lilac, 9 in., California; *bicolor*, purple and white, summer, 1 ft., California, var. *alba*, white; *grandiflora*, purple and blue, June, 18 in., N.W. America; *verna*, white and blue, May, 1 ft., N. America.

Collomia—*Polemoniaceae*. Hardy annuals. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open beds or borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in Sept., March or April where plants are required to flower. Thin seedlings to 3 in. apart when 2 in. high.

SPECIES CULTIVATED: *biflora* (syn. *C. coccinea*), red, June, 18 in., Chile; *grandiflora*, buff or salmon, summer, 18 in., California.

Colocasia (West Indian Kale)—*Araceae*. Stove herbaceous plants with perennial tuberous roots, some of which are edible. Leaves, shield-like, heart or egg-shaped, deep green. First introduced mid-sixteenth century.

CULTURE: Compost, equal parts turfy loam, peat, leaf-mould and silver sand. Position, well-drained pots in shady plant stove. Plant moderately firmly in pots just large enough to take tubers in Feb. or March; transfer to larger pots in April or May. Water moderately Feb. to April and Sept. to Nov., freely April to Sept.; keep quite dry Nov. to Feb. Temp., Feb. to Sept. 70° to 80°, Sept. to Nov. 65° to 75°, Nov. to Feb. 55° to 65°.

PROPAGATION: By dividing the tubers in Feb. or March.

SPECIES CULTIVATED: *C. antiquorum*, 'Egyptian Taro' or 'Culcas', 2 to 4 ft., E. Indies, and vars. *illustris*, *Fontanesii* and *euchlora*; *esculenta*, 'Dasheen', 'Taro Root', 2 to 3 ft., Pacific Isles.

Columbine, see *Aquilegia*.

Columnnea—*Gesneriaceae*. Stove evergreen trailing shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts fibrous peat, sphagnum moss and charcoal. Position, hanging baskets. Plant, March. Water freely in summer, moderately in winter. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings of firm shoots 3 in. long, in pots of above compost mixed with sand, in temp. 85° Feb.

SPECIES CULTIVATED: *C. Banksii*, scarlet, May, hybrid; *gloriosa*, scarlet and yellow, June, Costa Rica, var. *purpurascens*, scarlet and yellow, purple foliage, June; *magnifica*, scarlet, May, Costa Rica; *microphylla*, scarlet and yellow, June, Costa Rica; *Schiedeana*, scarlet, summer, Mexico.

Colutea (Bladder Senna)—*Leguminosae*. Hardy deciduous flowering shrubs. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, open or shady shrubberies, banks, etc. Plant, Oct. to Feb. Prune, Nov., simply cutting away weak shoots and shortening straggling ones, or may be restricted in size by annual hard pruning in spring. *C. arborescens* is the most popular species and will grow in almost any soil and situation, yellow flowers and inflated bladder-like pods.

PROPAGATION: By seeds sown 1 in. deep outdoors in Oct. or March; cuttings of firm shoots inserted in sandy soil outdoors in Oct.

SPECIES CULTIVATED: *C. arborescens*, yellow, Aug., 10 ft., S. Europe; *istria*, coppery yellow, May to Aug., 3 to 4 ft., Asia Minor; *media*, brownish red, summer, 8 to 10 ft., hybrid; *orientalis* (syn. *C. cruenta*), coppery red, June to Sept., 4 to 6 ft., Orient.

Combretum (Caffer Butter-shrub)—*Combretaceae*. Stove evergreen climbers. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Position, pots, tubs or borders in plant stove, shoots trained to pillars or roof. Pot, March. Prune side shoots to within 2 in. of base after flowering and cut away all weak ones. Water freely March to Sept., moderately afterwards. Syringe daily March to Aug. Temp., March to Sept. 70° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings of side shoots 3 in. long, removed with slight portion of stem attached, and inserted in well-drained pot of sandy soil in temp. 85° in summer.

SPECIES CULTIVATED: *C. coccineum*, scarlet, autumn, 20 ft., Madagascar; *grandiflorum*, scarlet, 5 ft., Trop. Africa; *racemosum*, white, spring, Trop. Africa.

Commelina—*Commelinaceae*. Greenhouse and hardy herbaceous perennials. First introduced mid-eighteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts peat, loam, leaf-mould and sand. Position, pots in sunny greenhouse. Pot, March. Water freely March to Sept., very little afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°.

CULTURE OF HARDY SPECIES: Soil, light, rich. Position, warm, sheltered, well-drained bed or border. Plant fleshy roots in April. Protect roots during winter on light soils with thick layer of ashes or manure. Lift roots in cold districts in Sept. and store away similarly to dahlias in frost-proof place, replanting in April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 75° in March, transplanting seedlings outdoors in May to flower in Aug.; division in April.

GREENHOUSE SPECIES CULTIVATED: *C. africana*, yellow, May to Oct., 1 to 3 ft., S. Africa; *elliptica*, white, July, 2 ft., Mexico.

HARDY SPECIES CULTIVATED: *C. coelestis*, 'Day Flower', 'Blue Spiderwort', blue, July, 18 in., Mexico, var. *alba*, white; *tuberosa*, blue, June to July, 1 to 1½ ft., Mexico.

Comparettia—*Orchidaceae*. An epiphytic genus, small growing. Flowers brightly coloured on spikes, produced from the base of the small pseudo-bulbs. The bases of the connate lower sepals are prolonged into a spur, concealing a two-horned spur formed by the base of the lip.

CULTURE: Compost, three parts of osmunda fibre, cut fine, and one and a half parts of sphagnum. Small pans which can be suspended in a tilted position as they require water in winter, but not too frequently, and at all times it should pass away quickly. The species are so distributed that temps. require consideration. 60° is sufficient in winter and but little more in summer for those from cooler habitats. A moist atmosphere should be maintained.

PROPAGATION: By division of plants in March.

SPECIES CULTIVATED: *C. coccinea*, scarlet and orange, Aug., Brazil; *falcata*, rose-purple, autumn, Brazil to Peru, Costa Rica; *macroplectron*, rose and purple, spur 2 in. long or more, autumn, New Grenada; *speciosa*, orange and cinnabar-red, lip yellow outside, summer, Ecuador.

Comptonia—*Myricaceae*. Hardy deciduous shrub. First introduced early eighteenth century.

CULTURE: Soil, peaty loam. Position, shady borders or shrubberies. Plant, Nov.

PROPAGATION: By layers in early spring.

SPECIES CULTIVATED: *C. peregrina* (syn. *C. asplenifolia*, *Myrica asplenifolia*), 'Sweet Fern', elegant fern-like foliage, 2 to 4 ft., Eastern N. America.

Conandron—*Gesneriaceae*. Hardy herbaceous perennial. First introduced late nineteenth century.

CULTURE: Soil, peat and loam. Position, fissures of moist, sheltered rockery. Plant, March or April. Protect in severe winters with covering of dry litter.

PROPAGATION: By seeds sown in well-drained pots of sandy peat and just covered with fine mould, in cold frame or greenhouse March or April; division of plant in March.

SPECIES CULTIVATED: *C. ramondioides*, lilac and yellow, summer, 8 to 12 in., Japan, var. *leucanthum*, white.

Cone Plant, see *Conophytum*.

Confederate Vine see *Antigonon leptopus*.

Coniogramme—*Polypodiaceae*. Greenhouse evergreen ferns.

CULTURE: Compost, one part fibrous peat, one part leaf-mould and loam, one part silver sand, charcoal and coarsely ground bones. Position, well-drained pots.

Pot, Feb. or March. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By spores; division.

SPECIES CULTIVATED: *C. japonica* (syn. *Gymnogramma japonica*), 'Bamboo Fern', fronds to 2 ft. long and 1 ft. wide, finely toothed, Japan, Formosa.

Conophytum (Cone Plant)—*Aizoaceae*. Greenhouse succulent plants.

CULTURE: Compost, six parts sharp sand, four parts rich loam, one part each mortar rubble and brick dust. Position, well-drained pots in sunny greenhouse or window, or bed on greenhouse staging. Plant or pot, August. Keep fairly moist during growing period, usually Aug. to Sept., very little water Oct. to April, quite dry May to July. Temp., Oct. to Mar. 55° to 60°, Mar. to Oct. 60° and over.

PROPAGATION: By seeds or cuttings; as Lithops.

SPECIES CULTIVATED: *C. altile* (syn. *Mesembryanthemum altile*), purple, Aug. to Oct., S.W. Africa; *bilobum* (syn. *M. bilobum*), yellow, Aug. to Oct., S.W. Africa; *gratum* (syn. *M. gratum*), magenta, Aug. to Oct., S.W. Africa; *minutum* (syn. *M. minutum*, *M. thecatum*), mauve, Aug. to Oct., S.W. Africa; *pallidum* (syn. *M. pallidum*), purple, Sept., S.W. Africa; *tabulare*, yellow, Aug. to Oct., S.W. Africa; *truncatellum*, yellow, Aug. to Oct., S.W. Africa.

Convallaria (Lily of the Valley; May Lily)—*Liliaceae*. Hardy herbaceous perennial.

OUTDOOR CULTURE: Compost, equal parts loam, leaf-mould, decayed manure and sharp sand. Position, beds or borders under shade of trees, high walls or fences for general culture; south border for early flowering. Plant single crowns 2 or 3 in. apart, with points just below surface, in Sept. and Oct. Lift and replant every four years, always planting largest crowns by themselves. Mulch bed annually in Feb. with decayed manure. Apply liquid manure once a week, May to Sept., to beds more than a year old.

POT CULTURE: Compost, equal parts good soil and leaf-mould. Plant one clump or a dozen single crowns in a 6 in. pot, well drained, in Oct. or Nov. Place inverted pot over crowns and stand in cold frame or under greenhouse stage until Jan., then remove into heat, or allow to bloom naturally in greenhouse or window. Water only when soil needs moisture in winter, freely when growth begins.

FORCING: Place single crowns close together in shallow boxes, with coconut-fibre refuse between roots, and put boxes in temp. 80° to 85°. Cover points of crowns with inverted box or thick layer of moss until flowers appear, then remove. After forcing, crowns of no value for flowering again, therefore discard them. Retarded roots flower quickly without much forcing.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in light soil outdoors in March; division of crowns Sept. or Oct.

SPECIES CULTIVATED: *C. majalis*, white, spring, 6 in., Europe (Britain), etc., var. *Fortunei*, larger flowers, *rosea*, pink flowered.

Convolvulus (Bindweed)—*Convolvulaceae*. Hardy annual and perennial plants mostly climbing or trailing.

CULTURE: Soil, ordinary, rich. Position, dwarf kinds in open beds and borders; tall kinds at base of arbours, walls or trunks of trees, etc. *C. Cneorum* and *C. mauritanicus* in sunny rock gardens. Plant perennials in March. Sow annuals in April where required and thin seedlings to 5 in. apart when 2 in. high.

PROPAGATION: By seed outdoors in March; division of roots in March or April.

SPECIES CULTIVATED: *C. althaeoides*, rose-pink, June to Aug., 1 to 2 ft., Medit. Region; *aureus superbus*, usually treated as annual, golden-yellow, summer, 4 to 5 ft., origin uncertain; *Cantabrica*, pale rose, June to Aug., 1 ft., Europe; *Cneorum*, white, tinged pink, summer, 2 to 3 ft., S. Europe; *mauritanicus*, blue, July, trailing, S. Europe; *tricolor*, annual, various, summer, 1 ft., S. Europe. See also *Calystegia* and *Ipomoea*.

Cooperia—*Amaryllidaceae*. Half-hardy, night-flowering, bulbous plants.

CULTURE: Compost, equal parts peat, loam and leaf-mould. Position, pots in

cool greenhouse or cold frame. Pot, Jan. or Feb. Water moderately until growth begins, then give freely; discontinue watering after Sept. and keep soil dry during winter. Temp., Sept. to Feb. 40° to 45°, Feb. to May 50° to 55°, May to Sept. 55° to 65°.

PROPAGATION: By offsets in Feb.

SPECIES CULTIVATED: *C. Drummondii*, 'Evening Star', white, Aug., 9 in., Texas; *pedunculata*, white, Aug., 8 in., Mexico.

Coprosma—*Rubiaceae*. Rather tender evergreen shrubs.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Position, pots in cool greenhouse. Repot, March. Prune straggling shoots into shape in March. Water moderately in winter, freely in summer. Temp., Sept. to March 40° to 45°, March to Sept. 55° to 65°. Hardy in sheltered positions outdoors S. of England.

PROPAGATION: By cuttings removed in March, with small portion of old wood attached, and inserted in well-drained pots of sandy soil in temp. 85° under bell-glass.

SPECIES CULTIVATED: *C. acerosa*, almost prostrate, blue translucent berries; *Baueri*, 'Tasmanian Currant', leaves green, 10 to 25 ft., New Zealand, Norfolk Islands, var. *variegata*, leaves edged with yellow, 3 ft.; *Petriei*, prostrate, purple berries, New Zealand; *rigida*, yellow, 15 ft., New Zealand.

Coptis (Goldthread; Mouth Root)—*Ranunculaceae*. Hardy evergreen bog plants. First introduced late eighteenth century.

CULTURE: Soil, moist peat. Position, shady. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in pans of fine sandy peat in shady, cold frame in March; division of roots in Oct. or March.

SPECIES CULTIVATED: *C. asplenifolia*, white, spring, 3 to 4 in., Japan; *quinquefolia*, white, spring, 2 to 3 in.; *trifolia*, white, April, 1 ft., N. Hemisphere.

Coral Vine, see *Antigonon*.

Corallita, see *Antigonon leptopus*.

Corallodiscus—*Gesneriaceae*. Evergreen, perennial, rock-garden plants at one time included in *Didissandra*.

CULTURE: Best grown in alpine house or cold frame in soil and under conditions similar to those required by *Ramonda*.

PROPAGATION: By seeds sown in gentle heat; leaf cuttings.

SPECIES CULTIVATED: *C. Forrestii*, white or deep blue, 2 to 3 in., early summer, Yunnan; *Kingianus*, violet blue, 6 in., summer, Himalaya; *lanuginosus*, lilac, 6 in., early summer, Himalaya.

Corchorus, see *Kerria japonica*.

Cordyline—*Liliaceae*. Greenhouse plants. Allied to and often called *Dracaena*. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part loam and sand. Position, pots in greenhouse. Repot, March. Water moderately Oct. to March, freely afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°.

PROPAGATION: By seeds sown 1 in. deep in pots of light soil in temp. 85° in March; cuttings of main stems cut into lengths of 1 in. and partially inserted horizontally in pots of sandy soil in March; cuttings of fleshy roots inserted 1 in. deep in pots of sandy soil, in March or April in temp. 75° to 80°; stem rooting in March or April; offsets inserted in 2 in. pots of sandy soil at any time.

SPECIES CULTIVATED: *C. australis* (syn. *Dracaena australis*), leaves broad and green, 15 to 40 ft., New Zealand; *Banksii*, ribbon-like leaves, 8 to 15 ft., New Zealand; *indivisa*, green, narrow, New Zealand; *stricta* (syn. *C. congesta*), leaves green and narrow, 6 to 10 ft., Australia; *terminalis* (syn. *Dracaena Baptistii*), leaves broad and green, 3 to 10 ft., E. Himalaya, China and E. Indies. There are many vars. with coloured or variegated leaves. See also *Dracaena*.

Coreopsis (Calliopsis; Tickseed)—*Compositae*. Hardy annual and perennial herbaceous plants. First introduced late seventeenth century.

CULTURE: Soil, ordinary. Position, sunny, well-drained beds or borders. Plant perennials in Oct. or March, annuals in May or June.

PROPAGATION: Annuals by seed sown $\frac{1}{8}$ in. deep in boxes of light soil in temp. 65° to 70° in March, or outdoors in April where plants are to flower; perennials by seed sown outdoors in April, transplanting seedlings to permanent position when large enough to handle; division of roots in Oct. or March.

ANNUAL SPECIES CULTIVATED: *C. Atkinsoniana*, yellow and purple, summer, 2 to 4 ft., Western U.S.A.; *basalis* (syn. *C. cardaminifolia*), yellow and brown-purple, summer, 6 to 24 in., Southern U.S.A.; *coronata*, orange and purple, summer, 2 ft., Texas; *Drummondii*, yellow and crimson, summer, 2 ft., Texas; *tinctoria* (syn. *C. bicolor*), yellow and purple, summer, 2 ft., N. America. 4 ft., Western U.S.A.; *cardaminefolia*, yellow and brown-purple, summer, 6 to 24 in., Southern U.S.A.; *coronata*, orange and purple, summer, 2 ft., Texas; *Drummondii*, yellow and crimson, summer, 2 ft., Texas; *tinctoria* (syn. *C. bicolor*), yellow and purple, summer, 2 ft., N. America.

PERENNIAL SPECIES CULTIVATED: *C. grandiflora*, yellow, Aug., 2 to 3 ft., Southern U.S.A., var. *auriculata superba*, golden yellow with crimson centre, and *flore pleno*, double form; *lanceolata*, yellow, Aug., 2 to 3 ft., Eastern U.S.A.; *major*, deep yellow, July to Sept., 2 to 3 ft., South-eastern U.S.A.; *palmata*, orange-yellow, July to Sept., 1½ to 3 ft., Central U.S.A.; *pubescens*, yellow and purple, summer, 2 to 4 ft., Southern U.S.A., and var. *superba*, large-flowered; *rosea*, rose-pink, summer, 9 to 24 in., U.S.A.; *verticillata*, yellow, Aug., 2 ft. The plant listed in catalogues as *C. auriculata* is really *C. pubescens*.

Coriander, see *Coriandrum sativum*.

Coriandrum—*Umbelliferae*. Hardy annual herbs. One species grown for the seeds which are used in curry powder, as seasoning, in confectionery and for flavouring alcoholic drinks and junkets.

CULTURE: Soil, ordinary. Position, south border, or open ground where it can be cut with a sickle if grown on a large scale. Seed ripens in August and is threshed and dried when ripe.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in drills 12 in. apart in April.

SPECIES CULTIVATED: *C. sativum*, 'Coriander', pale mauve, June, 2 to 3 ft., S. Europe.

Coriaria—*Coriariaceae*. Half-hardy deciduous flowering shrubs. Leaves and fruits poisonous.

CULTURE: Soil, ordinary. Position, sunny, sheltered borders. Plant in autumn.

PROPAGATION: By suckers or layers in autumn, or cuttings of half-ripened wood in sandy soil in frame or under hand-glass.

SPECIES CULTIVATED: *C. myrtifolia*, greenish, summer, 4 ft., S. France; *terminalis*, greenish, succeeded in autumn by waxy, currant-like berries, 4 ft., Sikkim, var. *xanthocarpa*, fruits yellow, the best one to grow. The leaves of the first yield redoul which is used in curing leather and for ink-making.

Coris—*Primulaceae*. Hardy biennial. First introduced early seventeenth century.

CULTURE: Soil, sandy peat. Position, well-drained beds on sunny rockery. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in Aug. or April where plants are to grow.

SPECIES CULTIVATED: *C. monspeliensis*, lilac, May, 1 ft., S. Europe.

Cork Oak, see *Quercus Suber*.

Corkscrew Rush, see *Juncus*.

Corn Flag, see *Gladiolus segetum*; **-flower**, see *Centaurea Cyanus*; **-Marigold**, see *Chrysanthemum segetum*; **-Salad**, see *Valerianella Locusta*; **Indian-**, see *Zea Mays*; **Pop-**, see *Z. Mays* var. *evecta*; **Sweet-**, see *Z. Mays* var. *rugosa*.

Cornel, see *Cornus sanguinea*.

Cornelian Cherry, see *Cornus mas*.

Cornus (Dogwood)—*Cornaceae*. Hardy deciduous flowering trees, shrubs and herbaceous perennials. Leaves, green or variegated with white and crimson. Some botanists divide this into a number of genera, i.e., *Chamaepericlymenum* (incl. *Ch. canadense* and *Ch. sibirica*), *Cynoxylon* (incl. *C. floridum* and *C. Nuttallii*), *Dendrobenthamia* (incl. *D. capitata*), *Macrocarpium* (incl. *M. mas*) and *Cornus* proper (incl. *C. sanguinea*).

CULTURE OF SHRUBBY SPECIES: Soil, sandy peat for dwarf, ordinary soil for others. Position, rockery for dwarf kinds, open or shady shrubberies for tall species. Plant, Oct. to Feb. The flowering species require no pruning but those grown for beauty of stem, such as *C. alba* and vars., *C. sanguinea* and *C. stolonifera*, may, if desired, be cut hard back annually in spring.

CULTURE OF HERBACEOUS SPECIES: Soil, bog or peat. Position, moist bed or rockery. Plant, March.

PROPAGATION: Shrubby kinds by cuttings of firm shoots in sandy soil outdoors in Nov.; layering shoots in spring; suckers removed from plant in Nov. and replanted at once; grafting variegated kinds in March; seeds sown outdoors in March. Herbaceous species by division in March.

SHRUBBY SPECIES CULTIVATED: *C. alba*, white, July, 8 to 10 ft., N. Asia, var. *sibirica*, coral branches, *Spaethii*, leaves edged yellow; *capitata* (syn. *Benthamia fragifera*), white, Aug., 10 ft., N. India, hardy S. of England only; *controversa*, white, June to July, 30 to 50 ft., Japan; *florida*, 'Flowering Dogwood', May, 10 to 15 ft., a beautiful shrub with showy white bracts, N. America, and var. *rubra*, rosy red; *Kousa*, creamy white, May to June, 15 to 20 ft., Japan and China; *macrophylla*, yellowish-white, July to Aug., 30 to 50 ft., Himalaya; *mas*, 'Cornelian Cherry', yellow, Feb., 15 ft., Europe, and vars. *aurea*, *elegantissima* and *variegata*; *Nuttallii*, creamy white, May, spice scented, pale rose bracts, Western N. America; *sanguinea*, green, June, 8 ft., branches red, Europe, Orient; *stolonifera*, 'Red Osier Dogwood', red-stemmed, to 8 ft., N. America, var. *flaviramea*, yellow branches.

HERBACEOUS SPECIES CULTIVATED: *C. canadensis* (syns. *Chamaepericlymenum canadense*, *Cornella canadensis*), purplish-white, May, 6 in., N. America.

Corokia—*Cornaceae*. Half-hardy evergreen shrubs. First introduced early nineteenth century.

CULTURE: Soil, preferably poor and light, well-drained. Position, sheltered, south or west wall. Plant, Oct. to April.

PROPAGATION: By cuttings inserted in sand in well drained pan under bell-glass; layering shoots in Oct.

SPECIES CULTIVATED: *C. Cotoneaster*, 6 to 8 ft., a curious shrub with twisted and contorted growth, and minute starry, yellow flowers in profusion, followed by orange berries, New Zealand.

Coronilla—*Leguminosae*. Greenhouse and hardy shrubs and hardy perennials. First introduced late sixteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part peat and sand. Position, pots in light greenhouse. Repot, March. Prune off points of shoots in spring to induce bushy growth. Water moderately Oct. to March, freely afterwards. Temp., Sept. to March 40° to 45°, March to Sept. 55° to 65°. Place plants outdoors in sunny position June to Sept.

CULTURE OF PERENNIALS: Soil, ordinary. Position, sunny rockeries or borders. Plant, Oct. or April.

CULTURE OF HARDY SHRUBS: Soil, ordinary. Position, sheltered, warm shrubberies, or south or west walls inland, or planted as maritime shrubs in exposed places and on chalk soils. Plant, Oct. Prune straggling shoots after flowering.

PROPAGATION: Greenhouse species by seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 75° in March, or by cuttings inserted in well-drained pots of sandy soil

under bell-glass in temp. 55° from March to May; perennial species by seeds sown $\frac{1}{8}$ in. deep outdoors in April, or division of roots in Oct.; hardy shrubs by cuttings in cold frame in autumn.

GREENHOUSE SPECIES CULTIVATED: *C. glauca*, yellow, May, 10 to 12 ft., evergreen, France.

PERENNIAL SPECIES CULTIVATED: *C. cappadocica* (syn. *C. iberica*, yellow, July, 6 in., Asia Minor; *minima*, yellow, June, 6 in., S. Europe; *varia*, 'Crown Vetch', pink and white, summer and autumn, 1 to 2 ft., trailer, Europe.

HARDY SHRUBS CULTIVATED: *C. emeroides*, yellow, May to Aug., 4 to 5 ft., deciduous, S.E. Europe; *Emerus*, 'Scorpion Senna', red and yellow, May to October, 7 to 9 ft., deciduous, Europe.

Correa (Australian Fuchsia)—*Rutaceae*. Greenhouse evergreen shrubs. First introduced late eighteenth century.

CULTURE: Compost, two parts peat, one part fibrous loam and sand. Position, pots, well drained, in light, airy greenhouse. Repot in July when new growth begins. Prune directly after flowering. Water moderately April to July and Oct. to April, freely July to Oct. Temp., Sept. to March 40° to 45°, March to Sept. 55° to 65°.

PROPAGATION: By cuttings inserted in well-drained pots of sandy peat under bell-glass in temp. 65° to 75° in April; grafting on *Correa alba* or *Eriostemon buxifolius* in March.

SPECIES CULTIVATED: *C. alba*, white, June, 5 to 6 ft.; *Harrisii*, scarlet, 3 ft., hybrid; *speciosa*, scarlet, June, 3 ft., Australia, vars. *Backhousiana*, *bicolor* and *pulchella*; *ventricosa*, bright salmon, 3 ft., Australia.

Cortaderia (Pampas Grass)—*Gramineae*. Large hardy perennial grasses with decorative plumes.

CULTURE: Soil, rich, light, sandy. Position, sheltered shrubberies or lawns. Plant, Oct. to April. Water freely in dry weather. Gather plumes for winter decoration directly fully developed, female plumes most durable.

PROPAGATION: By seed in sandy soil in well-drained pots in temp. 55° to 65°, Feb. to April. Transplant seedlings outdoors in Aug. or Sept.

SPECIES CULTIVATED: *C. rudijscula* (syns. *C. Quila*, *C. jubata*, *Gynerium argenteum*), 4 to 6 ft., Ecuador to Chile and Argentina; *Selloana* (syn. *C. argentea*, *Gynerium argenteum*), 10 to 15 ft., Argentina.

Cortusa—*Primulaceae*. Hardy perennial alpine plants. First introduced late sixteenth century.

CULTURE: Soil, sandy peat. Position, shady border or rockery. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in sandy peat in cold frame in March or Aug.; division of plant in March.

SPECIES CULTIVATED: *C. Matthioli*, 'Bear's-ear Sanicle', red, April, 1 ft., Europe, and vars. *alba*, white, *grandiflora*, purple, *pubens*, magenta-purple.

Coryanthes (Helmet or Bucket Orchids)—*Orchidaceae*. An epiphytal genus. Leaves ribbed, flowers on pendent or erect spikes from the base of the cone-shaped pseudo-bulbs. Sepals and petals flimsy, lip fleshy. First from a horizontal stalk at right angles descends a process often ribbed, this expands into a large receptacle which holds a liquid secreted by two glands at the column-base. An insect, usually a bee species, drops into this liquid and in forcing its way through a narrow passage, pollinates the next flower visited. The species are not often met with in cultivation.

CULTURE: Compost, two and a half parts of osmunda fibre, one and a half parts of sphagnum moss, and crushed potsherds. Baskets are preferable. Exposure to light in autumn benefits and though water is not required frequently in winter, a moist atmosphere should be maintained. Winter temp. 65°; summer, tropical.

PROPAGATION: By division of plants as they commence growth in spring.

SPECIES CULTIVATED: A selection only—*C. Bungerothii*, large, greenish-white, purple spotted, lip orange-yellow, yellow shaded and with red-brown spots, early summer, Venezuela; *leucocorys*, lip white, marbled and suffused with rose-purple, summer, Peru; *macrantha*, large, fragrant, yellowish, purple spotted, lip purplish, blood-red, spotted red-purple, summer, Brazil, Guiana, Venezuela; *maculata*, very variable, yellowish, spotted dull crimson, summer, Demerara, Brazil, Guiana; *speciosa* (syn. *Gongora speciosa*), variable, fragrant, yellowish, lip orange-yellow, red-brown and tawny-red, summer, Brazil, Cent. America.

Corydalis—*Fumariaceae*. Hardy annual and perennial herbs.

CULTURE: Soil, ordinary, good. Position, well-drained sunny borders, ledges of rockeries, fissures in old walls. Plant perennial and biennial species in March.

PROPAGATION: Annual species by seeds sown in April where plants are to flower; perennials by seed as for annuals, transplanting seedlings to permanent positions when large enough to handle; also by division of the plants after flowering; bulbous species by offsets in March.

PERENNIAL SPECIES CULTIVATED: *C. Allenii*, pink and white, spring, 3 to 4 in., N. America; *cashmeriana*, blue, April, 6 in., Kashmir; *cheilanthifolia*, yellow, summer, 10 in., China; *Halleri* (syn. *C. solida*), purple, April, 6 in., Europe; *lutea*, yellow, spring and summer, 1 ft., Europe; *nobilis*, yellow, May, 1 ft., Siberia; *thalictrifolia*, yellow, summer, 1 ft., China; *Wilsonii*, yellow, May, 9 in., W. China.

ANNUAL SPECIES CULTIVATED: *C. sempervirens* (syn. *C. glauca*), pale pink to purple, summer, 1½ ft., Canada.

Corylopsis—*Hamamelidaceae*. Hardy deciduous flowering shrubs. First introduced mid-nineteenth century.

CULTURE: Soil, sandy loam. Position, open, moist shrubbery in S. England; south walls in other parts of country. Plant, Oct. to Feb.

PROPAGATION: By layering shoots in Oct.

SPECIES CULTIVATED: *C. Griffithii*, yellow, March, 10 ft., rather tender, Himalaya; *pauciflora*, yellow, Feb., 3 ft., cowslip scented, not hardy in cold places, Japan; *spicata*, yellow, 3 ft., sweetly scented, Feb. to March, hardy, Japan.

Corylus (Cob-nut; Filbert)—*Betulaceae*. Hardy deciduous nut-bearing shrubs. Flowers, male—grey, female—crimson, March, April. Nuts ripe in Oct.

CULTURE: Soil, rich loam, well manured and deeply trenched. Position, open, sunny. Plant cob and hazel nuts 10 ft. apart each way, and filberts 15 ft. apart, in Oct. Prune end of March, cutting away shoots not less than two years old and shortening those of previous year's growth about one-third. Train each tree to have six main branches only. Gather nuts when husk becomes brown. Hang branches of hazel catkins (male flowers) in filbert bushes in Feb., if filbert catkins are scarce, to ensure fertilisation.

PROPAGATION: By seeds (nuts) 2 in. deep in Oct. in open garden, transplanting seedlings two years afterwards; suckers, removed from base of old plants replanted in Oct.; layering strong young shoots in Nov.; grafting on seedlings of Constantinople Nut in March to form standards, half standards, and dwarf standards.

SPECIES CULTIVATED: *C. Avellana*, 'Common Hazel', Europe (Britain), var. *aurea*, golden-leaved, *grandis*, 'Cob-nut'; *Colurna*, 'Constantinople Nut', tree, S.E. Europe; *maxima* (syn. *C. tubulosa*), 'Filbert', S. Europe, var. *atropurpurea*, purple-leaved.

Coryphantha—*Cactaceae*. Greenhouse succulent perennials. First introduced late seventeenth century.

CULTURE: Compost, equal parts sandy loam, broken brick and mortar-rubble. Position, sunny stage or shelf in cool, airy greenhouse or window. Pot, March or April, in well-drained pots sufficiently large to accommodate the roots. Repot only when necessary, usually every third year. Water moderately March to Sept., sparingly at other times. Spray overhead in summer. Ventilate freely in summer. Temp., March to Sept. 60° to 70°, Sept. to March, 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots or pans filled with sandy soil in temp. 70° in March, keeping soil moderately moist: by cuttings of the tops of the plants inserted in small pots of sandy compost in spring; by grafting on to *Cereus speciosissimus* at almost any time.

SPECIES CULTIVATED: *C. clava*, green, red and yellow, June, 1 ft., Mexico; *elephantidens*, violet-rose, autumn, 6 to 9 in., Mexico; *pectinata*, yellow, summer, 9 in., Texas, Mexico.

Cosmos—Compositae. Half-hardy annuals. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, warm, dryish border.

PROPAGATION: By seeds sown in light soil in temp. of 50° to 55° in March, transplanting seedlings outdoors 2 to 3 ft. apart in May.

SPECIES CULTIVATED: *C. atrosanguineus*, dark brownish-red, Sept., 1 to 3 ft., Mexico; *bipinnatus*, 'Purple Mexican Aster', various colours, Aug., 3 ft., Mexico; *diversifolius* (syn. *Bidens dahlioides*), lilac, Sept., 3 ft., Mexico; *sulphureus*, pale yellow, July to Aug., 3 to 4 ft., Mexico. There are many hybrids in a variety of colours.

Cossonia, see *Raffinellia*.

Cotinus—Anacardiaceae. Deciduous shrubs or trees with yellow wood and a strong-smelling juice. Formerly included in the genus *Rhus*.

CULTURE: Soil, ordinary, well drained. Position, sunny borders or shrubberies. Plant, Oct. to Feb.

PROPAGATION: By seeds; root cuttings; layers.

SPECIES CULTIVATED: *C. americanus* (syn. *Rhus cotinoides*), to 20 ft., brilliant autumn colouring, Southern U.S.A.; *Coggygia* (syn. *Rhus Cotinus*), 'American Smoke Tree', 'Wig Tree', to 15 ft., fruiting panicle with long greenish or purplish hairs, brilliant autumn colouring, S. Europe, var. *purpureus*, panicles with intensely purple hairs and young leaves purplish.

Cotoneaster—Rosaceae. Hardy evergreen and deciduous shrubs and a few small trees, bearing scarlet fruits in winter. All are hardy and the wide variety of types makes them most useful for many purposes in the garden.

CULTURE: Soil, ordinary. Position, shrubberies open or in shade, trailing species against walls or growing over tree roots and rocks or bare ground under trees. Plant, Oct. to Feb.

PROPAGATION: By seeds sown 1 in. deep outdoors in March; cuttings inserted in sandy soil in frames in Sept.; layering shoots in spring.

EVERGREEN SPECIES CULTIVATED: *C. conspicua*, 4 ft., spreading habit, free berrying, W. China, var. *decora*, prostrate form; *congesta*, 18 in., miniature for rockery, Himalaya; *Dammeri*, creeping, China; *Franchetii*, 8 ft., graceful arching growth, W. China, var. *cinerescens*, more vigorous; *glabrata*, China; *glaucophylla*, half-evergreen, to 7 ft., W. China; *Harroviana*, 6 ft., China; *Henryana*, 10 ft., pendulous branches, Cent. China; *lactea*, to 10 ft., China; *microphylla*, 2 ft., trailing, for walls or rockeries, Himalaya, var. *thymifolia*, 'Rose Box', more condensed form; *pannosa*, 10 ft., elegant growth, S.W. China; *rotundifolia*, 3 ft., spreading, scarlet fruits lasting till spring, N. India; *salicifolia* 10 ft., fast growing, elegant habit, W. China, var. *floccosa*, larger foliage, *rugosa*, similar; *serotina*, small tree, China; *turbinata*, to 6 ft., China.

DECIDUOUS SPECIES CULTIVATED: *C. acutifolia*, 10 ft., vigorous, fruit black, Cent. China, var. *villosula*, leaves pubescent beneath; *adpressa*, prostrate, W. China; *bullata*, 10 ft., spare habit, W. China; *divaricata*, 6 ft., autumn colour, spreading habit, Cent. China; *frigida*, 15 to 20 ft., vigorous, spreading, small tree, Himalaya, var. *Vicarii*, *fructu luteo*, large yellow fruits; *hebeophylla*, 8 ft., spreading, purple-red fruits, S.W. China; *horizontalis*, flat, fishbone growth, on walls up to 8 ft., or as a flat bush to 3 ft., China; *lucida*, 8 ft., upright habit, black fruits, N. Asia; *melanocarpa*, to 6 ft., Europe, Asia, var. *laxiflora*, 6 ft., large clusters dark purple fruits; *moupinensis*, 12 ft., autumn foliage, black fruit, W. China; *multiflora*,

early red fruits, 6 ft., China; *racemiflora*, 6 ft., slender arching habit, grey foliage, bright red oval berries, S.E. Europe, Asia; *Simonsii*, to 10 ft., upright habit, sometimes used for hedging, Himalaya; *Watereri*, 15 ft., vigorous free-fruited hybrid; *Zabelii*, 6 ft., purple pear-shaped berries, China.

Cotton, see *Gossypium*; **-Grass**, see *Eriophorum*; **-Lavender**, see *Santolina Chamaecyparissus*; **-wood**, see *Populus deltoides*.

Cotula—*Compositae*. Hardy, evergreen, creeping, rock plants.

CULTURE: Any soil, even the poorest. Position, full sun.

PROPAGATION: By division and seeds.

SPECIES CULTIVATED: *C. acaenifolia*, flowers inconspicuous, ferny leaves in prostrate mats, New Zealand; *coronopifolia*, bronze-green carpets, S. Temp. Zone; *potentillina*, green mats of fern-like leaves, Chatham Islands; *squalida*, bronze carpets, New Zealand.

Cotyledon—*Crassulaceae*. Evergreen succulent plants. Some species formerly included here have been reclassified and will be found in the genera *Chiastophyllum*, *Echeveria*, *Rosularia* and *Umbilicus*.

CULTURE: Soil, ordinary. Position, sunny beds, rock gardens or windows. Plant, Oct. or March.

PROPAGATION: By division in March.

SPECIES CULTIVATED: *C. macrantha*, red, Dec. to spring, 1 to 2½ ft., Cape; *orbiculata*, red, drooping, summer, to 4 ft., S. Africa; *paniculata*, red, summer, to 5 ft., S. Africa; *simplicifolia*, yellow, drooping, summer, 6 in., S. Europe; *undulata*, yellowish-red, spring to summer, S. Africa.

Cowberry, see *Vaccinium Vitis-idaea*.

Cow Parsnip, see *Heracleum*.

Crab Apple, see *Malus*; **-Cactus**, see *Zygocactus truncatus*.

Crambe (Seakale)—*Cruciferae*. Hardy herbaceous perennials and one esculent vegetable.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary, rich. Position, open borders. Plant roots 3 in. deep in groups of three or six in March.

CULTURE OF SEAKALE: Soil, deep, rich, sandy. Position, open, sunny. Trench soil 2 ft. deep in autumn, incorporating an abundance of manure. Plant roots 4 to 6 in. long, 2 in. deep, upright, 18 in. apart in rows 30 in. asunder in Feb. or March. Pare off crown buds before planting. Mulch beds with stable manure in April. Apply common salt at the rate of 1 lb. to a square rod, or 1 lb. of nitrate of soda to same area in June. Lift and replant every five years. Manure and dig between rows in Nov. Blanching: Cover roots in open ground with inverted pots, dry tree leaves, or cinder ashes in Nov.

FORCING OUTDOORS: Cover roots with inverted pots in Nov. and put thick layers of fresh manure and leaves on these in Jan.

FORCING INDOORS: Lift roots in Nov., Dec. or Jan. and place them close together in large pots or boxes, with ordinary soil between, in temp. 50° to 60°. Keep roots moist and dark. Roots of no value after forcing.

PROPAGATION: By seed sown 1 in. deep in rows 12 in. apart in March, thinning seedlings to 6 in. apart in June and transplanting them to permanent beds when a year old, or by cuttings of roots as advised for planting; perennials by seeds sown ½ in. deep outdoors in March, transplanting seedlings in July; cuttings of shoots or division of roots in March. Seeds germinate in 18 to 20 days. Crop arrives at maturity two years after sowing.

SPECIES CULTIVATED: *C. cordifolia*, 'Flowering Seakale', white, May, 5 ft., Caucasus; *maritima*, 'Seakale', white, May and June, Europe (Britain); *orientalis*, white, fragrant, June, 4 ft., Orient.

Cranberry, see *Vaccinium Oxycoccus*; **American-**, see *V. macrocarpum*; **-Gourd**, see *Abobra viridiflora*.

Cranesbill (*Geranium*).

Crape Myrtle, see *Lagerstroemia indica*.

Craspedia—*Compositae*. Evergreen, perennial, rock-garden plants.

CULTURE: Soil, sandy loam. Position, full sun.

PROPAGATION: By seeds sown when ripe.

SPECIES CULTIVATED: *C. uniflora*, yellow, 9 in., summer, New Zealand.

Crassula—*Crassulaceae*. Greenhouse evergreen plants. First introduced early eighteenth century.

CULTURE: Compost, equal parts sandy loam, brick rubble, dried cow manure and river sand. Position, well-drained pots in light greenhouse, close to glass. Pot, March. Water freely April to Aug., moderately Aug. to Nov., very little afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°.

PROPAGATION: By seeds sown in well-drained pots or pans of sandy soil, just covering seeds with fine soil, in temp. 60° to 70° in March or April, seedlings to be kept close to glass and have little water; cuttings of shoots 2 to 3 in. long, exposed to sun for few days, then inserted in June, July or Aug. in well-drained pots of sandy soil, placed on greenhouse shelf and given very little water.

SPECIES CULTIVATED: *C. arborescens*, pink, May, 2 to 10 ft., S. Africa; *argentea*, white or pink, to 10 ft., S. Africa; *columnaris*, white, summer, 6 in., S. Africa; *falcata* (syn. *Rochea falcata*), yellow and red, summer, 6 in., S. Africa; *lactea*, white, autumn, 9 in., S. Africa; *lycopodioides*, greenish, 2 ft., S. Africa; *multicaeva*, white, 6 in., S. Africa; *perforata*, yellowish, 4 ft., S. Africa; *pyramidalis*, white, 1 to 2 ft., S. Africa. See also *Rochea*.

Crataegus (*Hawthorn*)—*Rosaceae*. Hardy, spiny, deciduous shrubs and small trees.

CULTURE: Soil, ordinary, rich. Position, woods, shrubberies, lawns and pleasure grounds, common quick in hedges. Plant, Oct. to Feb. Prune in Nov., simply cutting into shape where necessary. Hedges: Soil, ordinary, trenched 2 ft. deep and 2 ft. wide. Plant, Nov. to March. Distance apart, 4 in., single row, 6 in. double row, 6 in. asunder. Quantity of plants required for single row 9, double row 12 per yard. Trim to shape in July and Aug.

PROPAGATION: By seed; budding choice varieties on common hawthorn; grafting in March. Berries require to be stored in sand for a year before sowing.

SPECIES CULTIVATED: *C. Azarolus*, white, fragrant, May, 15 ft., S. Europe; *Calpodendron*, white, June, 20 ft., U.S.A.; *Crus-galli*, 'Cockspur Thorn', white, June, 20 ft., N. America; *Douglasii*, white, May, 15 ft., N.W. America; *heterophylla*, white, May to June, 20 ft., W. Asia; *intricata* (syn. *C. coccinea*), white, May, 20 ft., N. America; *Lavallei* (syn. *C. Carrierei*), white, May, 12 to 15 ft., hybrid; *macracantha*, white, May to June, 15 ft., Eastern N. America; *mollis*, white and red, May, 20 ft., U.S.A.; *monogyna*, 'Quick', white, May, 25 to 35 ft., Britain, and var. *biflora*, 'Glastonbury Thorn'; *orientalis*, white, May, 15 ft., S.E. Europe, W. Asia; *Oxyacantha*, 'Common Hawthorn', 'May', white, May, 15 ft., Europe, and vars. *alba*, white, *coccinea*, crimson, *Paulii*, bright scarlet double, *plena*, double white, *punicea*, dark red, *rosea*, rose; *pinnatifida*, white, May, 15 ft., Asia; *punctata*, white, June, 25 ft., Eastern N. America; *tanacetifolia*, white, May, 15 ft., Levant.

Cream Cups, see *Platystemon californicus*.

Creeping Forget-me-not, see *Omphalodes verna*; **-Harebell**, see *Wahlenbergia hederacea*; **-Jenny**, see *Lysimachia Nummularia*; **-Sailor**, see *Saxifraga sarmentosa*; **-Speedwell**, see *Veronica repens*; **-Willow**, see *Salix repens*; **-Winter Green**, see *Gaultheria procumbens*.

Cremanthodium—*Compositae*. Hardy herbaceous plants including many dwarf, high-alpine species, but they are difficult to grow and seldom seen in cultivation.

CULTURE: Soil, deep, well-drained loam. Position, full exposure, not too arid.

PROPAGATION: By seeds sown when ripe.

SPECIES CULTIVATED: *C. nobile*, yellow, 2 ft., May to June, W. China; *reniforme*, yellow, 1 to 2 ft., summer, Himalaya.

Crepis (Hawk's Beard)—*Compositae*. Hardy herbaceous perennials and annuals.

CULTURE: Soil, ordinary, sandy. Position, sunny borders, banks or rockeries. Plant perennial species in March or April.

PROPAGATION: Annual species by seeds sown $\frac{1}{4}$ in. deep in April where plants are required to flower; perennial species by seeds sown $\frac{1}{4}$ in. deep outdoors in April, transplanting seedlings in July, or by division of roots in March or April.

SPECIES CULTIVATED: *C. aurea*, orange, autumn, 12 in., annual, Europe; *incana*, pink, 9 to 12 in., July, Greece; *rubra*, red, autumn, 1 ft., S. Europe. See also Tolpis.

Cretan Dittany, see *Origanum Dictamnus*; **-Mullein**, see *Celsia cretica*; **-Spikenard**, see *Valeriana Phu*.

Crimson Flag, see *Schizostylis*.

Crinodendron—*Elaeocarpaceae*. Rather tender evergreen flowering shrubs sometimes known as *Tricuspidaria*. First introduced mid-nineteenth century.

CULTURE: Soil, moist, lime-free loam with peat and leaf-mould. Position, in the open in mildest districts, with some shade. In other southern counties good for a partially shaded wall, even with N. aspect. Can also be grown in tubs or large well-drained pots in unheated greenhouse. Plant, or pot, Sept. to Oct. or April to May. *C. Patagua* is the more attractive species but less hardy.

PROPAGATION: By cuttings of half-ripened shoots in sandy soil under bell-glass in gentle bottom heat during July or Aug.

SPECIES CULTIVATED: *C. dependens*, white, late summer, 15 to 30 ft., Chile; *Patagua* (syn. *Tricuspidaria lanceolata*), crimson hanging lanterns, May to June, 10 to 20 ft., Chile.

Crinum—*Amaryllidaceae*. Stove, greenhouse and hardy deciduous bulbous plants. First introduced early eighteenth century.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, two parts turfy loam, one part peat and silver sand. Position, pots in light plant stove or greenhouse. Pot, March, in large pots or tubs, well drained. Water freely March to Oct., very little afterwards. Store pots containing bulbs on their sides in stove or greenhouse during winter. Repot every 3 or 4 years. Apply liquid manure to established bulbs in summer. Temp., March to Sept. 75° to 85° for stove, 55° to 65° for greenhouse; Sept. to March, 55° to 65° for stove, 45° to 50° for greenhouse.

CULTURE OF HARDY SPECIES: Soil, rich, deep. Position, south, well-drained border. Plant bulbs 6 in. deep in March.

PROPAGATION: By seeds sown in sandy soil in a temp. of 65° to 75° in spring; also by offsets at potting or planting time. Seedling plants take several years to flower.

STOVE SPECIES CULTIVATED: *C. amabile*, red, fragrant, summer, 3 ft., Sumatra; *erubescens*, white, purplish red and pink, July, 2 to 3 ft., Trop. America; *Kirkii*, white and red, Oct., 2 ft., Zanzibar; *Sanderianum*, white and red, 2 ft., Trop. Africa; *scabrum*, white and crimson, May, 2 to 3 ft., Trop. Africa; *zeylanicum*, white and red, July, 2 to 3 ft., Trop. Asia and Africa.

GREENHOUSE SPECIES CULTIVATED: *C. americanum*, white, July, 1 to 2½ ft., Southern U.S.A.; *asiaticum*, white, July, 2½ to 3½ ft., Trop. Asia; *Macowanii*, white and purple, autumn, 3 ft., Natal; *Moorei*, white and red, April to Oct., 2 ft., S. Africa, vars. *album*, white, *variegatum*, leaves variegated.

HARDY SPECIES CULTIVATED: *C. longifolium* (syn. *C. capense*), 'Cape Lily', pink, summer, 3 ft., S. Africa, var. *album*, white; *Powellii*, rose, summer, 3 ft., hybrid, and vars. *album* and *rubrum*.

Crithmum—*Umbelliferae*. Hardy perennial herb. Leaves used for pickling.

CULTURE: Soil, sandy. Position, shady border. Sow seeds thinly in bed or ordinary sandy soil in March. Not an easy plant to grow away from the seashore.

SPECIES CULTIVATED: *C. maritimum*, 'Samphire', white, summer, 1 ft., seashores of Britain.

Crocasmia—Iridaceae. Hardy or half-hardy cormous plants. The common Montbretia of gardens is *C. crocosmaeflora*, a hybrid between *C. aurea* and *C. Pottsii*.

CULTURE: Soil, sandy loam. Position, sunny, well-drained borders. Can be treated like Gladioli or if left in the ground permanently should be lifted, divided and replanted every three years. Plants left in the ground should have a covering of leaves or ashes during winter.

POT CULTURE: Compost, equal parts turfy loam, peat, leaf-mould and silver sand. Position, cold frame or greenhouse. Pot, Oct., placing six bulbs in 5-in. pot. Water when growth commences, keep moderately moist until foliage dies down, then keep dry.

PROPAGATION: By seed; offsets.

SPECIES CULTIVATED: *C. aurea*, 'Coppertip', bright orange-yellow, to 4 ft., S. Africa; *crocosmaeflora* (syn. *Tritonia crocosmaeflora*), 'Montbretia', orange-crimson, 2 to 3 ft., late summer, hybrid; *Pottsii* (syn. *Tritonia Pottsii*), orange-yellow, Aug., 3 ft., S. Africa.

Crocus—Iridaceae. Hardy bulbous flowering plants.

OUTDOOR CULTURE: Soil, light, rich. Position, margins of beds or borders or in grass plots and lawns, open or in shade, for common kinds; sunny, well-drained beds, or on rockeries, for rare and choice kinds. Plant spring-flowering species and varieties in Oct., Nov. or Dec.; autumn-flowering species in Aug. and Sept. Depth and distance: Common kinds, 3 in.; choice and rare kinds, 2 in. Leave corms undisturbed for four or five years, unless their place is wanted for other plants. Lift when necessary in June or July, drying corms in sun and storing in cool room till planting time. Foliage should not be removed until it turns yellow.

CULTURE IN GRASS: Bore holes 3 in. deep and 2 in. apart, insert a corm in bottom of each, then fill up with ordinary soil; or lift turf, fork up soil below, add a little bonemeal, place bulbs thereon and replace turf. Grass should not be cut till foliage turns yellow.

POT CULTURE: Compost, light, rich, sandy soil. Position, ten in 5-in. pot, or four in a 3-in. size, in Oct. or Nov. After potting, place in cold frame or under a wall and cover with cinder ashes till growth begins, then remove to greenhouse, etc. Water freely when growth begins; give less as foliage fades. Corms of no use for flowering second time in pots, but may be planted out in garden. To force, place in temp. 55° to 65° in Dec. or Jan.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep and 1 in. apart in light sandy soil in cold frame in Sept., Oct. or Nov., transplanting seedlings in Aug. of second year; offsets removed from old corms in July or Aug. and replanted 2 in. deep and 2 in. apart at same time. Seedling corms flower when three and four years old.

SPECIES CULTIVATED: *asturicus*, violet, autumn, Spain; *Balansae*, orange-yellow, March, Asia Minor; *banaticus*, white and purple, March, Hungary; *biflorus*, 'Scotch Crocus', lavender, Feb., Tuscany; *byzantinus* (syn. *C. iridiflorus*), purple and lilac, autumn, E. Europe; *cancellatus*, yellow, white and purple, autumn, Asia Minor; *chrysanthus*, orange-yellow, Jan. to March, S.E. Europe; *Clusii*, white and purple, autumn, Spain; *dalmaticus*, yellow and purple, Feb. to March, Dalmatia; *etruscus*, lilac and yellow, March, Italy; *Fleischeri*, yellow and purple, March, Asia Minor; *Imperati*, lilac, Jan. to March, Italy; *Korolkowii*, yellow, Feb. to March, Cent. Asia; *longiflorus*, lilac, yellow and purple, autumn, Italy; *Malyi*, yellow, orange and purple, March, Dalmatia; *medius*, white and purple, autumn, Italy; *minimus*, purple, March and April, Corsica; *C. moesiacus*, yellow, Feb., S.E. Europe; *nudiflorus*, purple, autumn, Pyrenees; *ochroleucus*, white and orange, autumn, Asia Minor; *pulchellus*, lavender, blue or yellow, autumn, Turkey; *reticulatus*, white, lilac and purple, March, E. Europe; *sativus*, 'Saffron Crocus', white, lilac and purple, autumn, Western Asia; *Sieberi*,

lilac and yellow, Feb. to March, Greece; *speciosus*, lilac and purple, autumn, Cent. Europe; *suaveolens*, orange, lilac and purple, March, Italy; *susianus*, orange and brown, Feb., Crimea; *Tomasinianus*, pale sapphire-lavender, spring, Dalmatia and Serbia; *vernus*, lilac, violet and white, Feb. to April, Europe; *versicolor*, white to purple, March, France and Italy; *zonatus*, rosy lilac and yellow, autumn, S. Europe and Asia Minor. The numerous Dutch forms in cultivation were originally derived from *C. vernus*.

Crossandra—*Acanthaceae*. Stove evergreen flowering shrub. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat and sand. Position, pots in moist plant stove. Pot, March. Water moderately during winter, freely other times. Temp., Oct. to March 55° to 65°, March to Oct. 75° to 85°.

PROPAGATION: By cuttings of shoots 2 or 3 in. long, inserted in sand under bell-glass, in temp. of 85° at any time of year.

SPECIES CULTIVATED: *C. guineensis*, lilac, October, 6 in.; *infundibuliformis* (syn. *C. undulataefolia*), orange-red, spring, 12 to 18 in., India, Malaya; *mucronata*, scarlet, summer, 2 ft., E. Trop. Africa; *subacaulis*, orange, 6 in., spring, E. Trop. Africa.

Cross Vine, see *Bignonia capreolata*; **-wort**, see *Crucianella*.

Croton, see *Codiaeum*.

Crowberry, see *Empetrum*.

Crowea—*Rutaceae*. Greenhouse evergreen shrubs. First introduced early eighteenth century.

CULTURE: Compost, two parts peat, one fibrous loam, and little sand. Position, pots in light airy greenhouse. Pot, March or April. Prune straggling shoots into shape in March. Water very little Oct. to March, moderately March to Oct. Temp., Sept. to March 40° to 45°, March to Sept. 55° to 65°.

PROPAGATION: By cuttings inserted in sand under bell-glass in temp. of 65° to 75° in March or April; grafting on *Correa alba* or *Eriostemon buxifolia* in March.

SPECIES CULTIVATED: *C. angustifolia*, red, summer, 1 to 3 ft., Australia; *saligna*, pink, summer, 1 to 2 ft., Australia.

Crowfoot, see *Ranunculus*.

Crown Imperial, see *Fritillaria imperialis*; **-Vetch**, see *Coronilla varia*.

Crucianella (Cross-wort)—*Rubiaceae*. Hardy herbaceous perennial. First introduced early seventeenth century.

CULTURE: Soil, sandy or chalky. Position, dry banks, rockeries or borders. Plant, Oct. or March.

PROPAGATION: By seeds sown outdoors in March, transplanting seedlings to permanent positions in July or Aug.; division of roots in March, April, Oct. or Nov.

SPECIES CULTIVATED: *C. stylosa* (syn. *Phuopsis stylosa*), rose, summer, 9 to 12 in., Caucasus, and vars.

Cryophytum—*Aizoaceae*. Annual succulent plant, formerly included in *Mesembryanthemum*.

CULTURE: Soil, ordinary. Position, sunny bed, border or rockery. Sow seeds $\frac{1}{8}$ in. deep in sandy soil in temp. 55° to 65° in March, transplanting seedlings outdoors in June.

PROPAGATION: By seed.

SPECIES CULTIVATED: *C. crystallinum* (syn. *Mesembryanthemum crystallinum*), 'Ice Plant', white, July, S. Africa.

Cryptanthus—*Bromeliaceae*. Stove, epiphytic, stoloniferous herbs with flattened rosettes of stiff, prickly-margined leaves. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous loam, rough peat, leaf-mould and silver

and. Pot, March. Water freely always; good drainage essential. Temp., Sept. to March 65° to 75°, March to Sept. 75° to 85°.

PROPAGATION: By large offsets inserted singly in small pots in temp. of 85° in April.

SPECIES CULTIVATED: *C. acaulis*, white, Aug., 6 to 8 in., Brazil, and vars. *discolor* and *ruber*; *Beuckeri*, red and white, summer, 6 in., Brazil; *bivittatus*, white, Aug., 8 to 10 in., Trop. America; *zonatus*, white, 6 in., Brazil. See also *Tillandsia*.

Cryptocoryne (Water Trumpet)—*Araceae*. Asiatic bog plants much used in the tropical aquarium.

CULTURE: Stove treatment and boggy soil or planted submerged in aquariums round 65°, subdued light. Soil, aquarium compost or loamy soil with slightly acid reaction.

PROPAGATION: By division.

SPECIES CULTIVATED: *C. Beckettii*, small, India; *ciliata*, 12 in., thick narrow leaves, India; *cordata*, greenish-purple, Malay; *Griffithii*, crinkled foliage, purple flowers, Malay; *Nevellii*, dwarf, India; *Wightii*, tapering leaves, curled at edges, India, Malay.

Cryptogramma—*Polypodiaceae*. Hardy deciduous fern with parsley-like fronds.

CULTURE: Soil, equal parts loam and peat with a liberal supply of broken bricks or stone, quite free from lime. Position, cool, moist rockery. Does well in moist fissures of rocks. Plant in spring.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *C. crispa* (syn. *Allosorus crispus*), 'Parsley Fern', 3 to 6 in., mountains of Wales, Scotland, etc.; *acrostichoides*, 6 to 8 in., N. America.

Cryptomeria—*Pinaceae* (or *Taxodiaceae*). Hardy evergreen coniferous tree. Foliage bright green in spring and summer; bronzy crimson during winter. First introduced early nineteenth century.

CULTURE: Soil, deep, rich, moist loam. Position, sheltered on lawns. Plant, Oct. to April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy loam in temp. of 55° in March or outdoors in April; cuttings of side shoots 2 or 3 in. long, inserted in sandy soil under hand-light, or in cold frame, in Sept. or Oct.

SPECIES CULTIVATED: *C. japonica*, 'Japanese Cedar', 70 to 100 ft., Japan, and vars. *araucarioides*, branchlets long and thin, *elegans*, delicate, glaucous green foliage changing to bronzy red in autumn, *nana*, 3 to 4 ft., *Lobbii*, branchlets stiffer and tufted, *spiralis*, dwarf, dense habit.

Cryptophoranthus—*Orchidaceae*. Small tufted epiphytes, the short stems carrying a single leaf. The small flowers, one or few, are carried at junction of stem with leaf. The sepals are connate basally and apically, leaving an aperture on each side to admit insects.

CULTURE: Compost, etc., as for *Masdevallias* with fewer winter waterings.

PROPAGATION: By division of the plants; occasionally small plants are produced at the bases of the old leaf blades.

SPECIES CULTIVATED: *C. atropurpureus* (syn. *Masdevallia fenestrata*), dark purple, autumn, Jamaica; *Dayanus*, yellow and red-purple, comparatively large, height 3 to 8 in., various, Colombia; *Lehmannii*, greenish-yellow and dull purple, various seasons, Brazil; *maculatus*, yellow, spotted crimson, fasciculate, summer, Brazil.

Cuchay, see *Allium tuberosum*.

Cuckoo Flower, see *Cardamine pratensis*; **-pint**, see *Arum maculatum*.

Cucumber, see *Cucumis sativus* var. *anglicus*; **Ridge-**, see *C. sativus*; **-Tree**, see *Magnolia acuminata*.

Cucumis—*Cucurbitaceae*. Half-hardy trailing, fruiting plants. Introduced late sixteenth century.

CULTURE OF CUCUMBERS IN COLD HOUSE: Build beds on the staging or grow in boxes using a compost of two parts chopped, stacked loam to one part of farm-

yard manure containing plenty of long straw with 1 lb. bone meal and 1 lb. lime per barrowload. Beds should be 18 in. at base and 12 in. wide at top, 10 in. high and flat-topped. Purchase plants for setting out in mid-May or sow seed direct in the bed in mid-May. Maintain a moist atmosphere by syringing. Mulch as young roots appear on surface using same compost as for beds. Training: Tie inside wires close to glass, taking main stem to required height then stopping it. Tie laterals to nearest wire and stop 2 leaves beyond first fruit. Remove male flowers and tendrils, stop secondary laterals 2 leaves beyond first fruit. Cut older leaves as they yellow to allow room for young leaves which should be pushed behind the wires to provide shade. Keep beds moist—boxes will need careful watering. Top-dress with fertiliser fortnightly, 6 weeks after planting.

CULTURE OF CUCUMBER IN FRAMES: Make compact hotbeds 3 ft. high and width greater than that of available lights. When constant night temp. of 65° is reached, place a mound of cucumber compost in each frame on hotbed and sow or plant in this. Stop when 7 leaves form and take three resulting laterals the length of the frame then stop. Allow fruit on sub-laterals and stop 2 leaves beyond each fruit. Keep moist by syringing overhead. Shade in very sunny weather.

CULTURE IN HEATED GREENHOUSE: Sow during autumn and winter in night temp. never less than 60°. Except in short days of Nov. and Dec. fruit will be out 3 months after sowing. Use open potting compost and sow single seeds in small-60 pots. Prepare beds, train plants as detailed for cold houses. Winter and spring temps., 65° night, 70° to 75° day. During May, temp. will rise to 80° by sun heat, and ventilation must be allowed. Day fire heat will be unnecessary in summer but fires should be kept very low and a little heat given at night.

CULTURE OF RIDGE CUCUMBERS AND GHERKINS: Prepare holes 18 in. square by 1 ft. deep, filling with compost of two parts soil, one manure. Set out hardened-off plants end May or sow direct in a pocket of soil. Top-dress when in flower with complete fertiliser in showery weather. Pick when small and green. Train Japanese climbing cucumber up pea sticks.

CULTURE OF MELONS: Seed sowing, preparation of beds and planting as for cucumbers. Fruits on side shoots. Allow four per plant, fertilising flowers at same time. Stop side growths as they grow into next plant. When ripening keep atmosphere buoyant. Support fruits in nets.

SPECIES CULTIVATED: *C. Anguria*, 'Bur Gherkin', pickling; *Melo*, 'Melon', var. *cantalupensis*, 'Cantaloup Melon', var. *inodorus*, 'Cassaba Melon'; *sativus*, 'Ridge Cucumber', 'Gherkin', var. *anglicus*, 'English Forcing Cucumber'.

Cucurbita—*Cucurbitaceae*. Half-hardy annual edible or ornamental-fruited trailing plants. First introduced late sixteenth century.

CULTURE OF MARROWS AND PUMPKINS: Soil, ordinary, rich. Position, beds in frames, on heaps of decayed manure or refuse, or on banks, the shoots running down the slope, or in beds in open garden formed by digging out soil 15 in. deep, filling holes with heated manure and covering this with soil. Sow seeds in a temp. of 55° in April, or where the plants are intended to grow in May. Plant, May, under hand-light, or in June without protection. Pinch out points of main shoots when 18 in. long; no pinching required afterwards. Fertilise female blooms. Water freely in dry weather. Apply liquid manure frequently after fruit is set. Fruit for preserving should be cut when yellow and then hung up in a dry room till wanted for use.

CULTURE OF GOURDS: Soil, rich, ordinary. Position, beds at base of low, sunny fences or walls, or on the summits of banks, shoots growing at will up and over the former or down the latter. Plant, June. Water freely in dry weather. Apply liquid manure occasionally when plants are laden with fruit. Gather fruit when yellow, and hang it up in dry room till wanted for use. No pinching of shoots required.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 55° to 65° in April, or where plants are to grow in May and June.

SPECIES CULTIVATED: *C. ficifolia*, 'Malabar Gourd', fruits green with white stripes, grown for ornament, E. Asia; *maxima*, 'Autumn and Winter Squash', edible, origin unknown; *moschata*, 'Pumpkin', edible, origin unknown; *Pepo*, 'Summer and Autumn Pumpkin', 'Vegetable Marrow', edible, origin unknown. Numerous horticultural vars. and some bush (not trailing) forms.

Cuminum—*Umbelliferae*. Half-hardy annual herb with aromatic fruits used as flavouring.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Sow seeds during May where plants are required. Gather seeds in July and Aug.

SPECIES CULTIVATED: *C. Cyminum*, white or rose, 6 in., Medit. Region.

Cunila—*Labiatae*. Aromatic perennial herbs.

CULTURE: Good friable loamy soil. Position, sunny, but not too arid and sun-baked.

PROPAGATION: Seed and cuttings.

SPECIES CULTIVATED: *C. origanoides* (syn. *C. Mariana*), 'Maryland Dittany', pink, 9 in., autumn, N. America.

Cunninghamia—*Pinaceae* (or *Taxodiaceae*). Hardy evergreen ornamental tree. One of the most ancient types of vegetation. First introduced early nineteenth century.

CULTURE: Soil, deep, well-drained loam. Position, sheltered from cold winds. Plant, Nov.

PROPAGATION: By seeds sown in sandy soil in warm greenhouse during Feb. or March.

SPECIES CULTIVATED: *C. lanceolata* (syn. *C. sinensis*), 70 to 150 ft., China.

Canonia—*Cunoniaceae*. Greenhouse evergreen flowering tree. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy loam and peat. Position, pots in light airy greenhouse. Pot, March. Prune into shape in March. Water moderately Oct. to March, freely afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil under bell-glass in temp. of 65° to 75° in summer.

SPECIES CULTIVATED: *C. capensis*, 'Red Alder', white, Aug., to 50 ft., S. Africa.

Cup Flower, see *Nierembergia*; -and **Saucer Flower**, see *Cobaea scandens*; -**Plant**, see *Silphium perfoliatum*.

Cupania—*Sapindaceae*. Stove, ornamental foliage, evergreen trees. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam and peat. Position, pots in moist plant stove. Pot, March. Water moderately in winter, freely other times. Prune occasionally to maintain a dwarf habit. Temp., Oct. to March 55° to 65°, March to Sept. 75° to 85°.

PROPAGATION: By cuttings of firm shoots inserted in sand under bell-glass in temp. of 85° in summer.

SPECIES CULTIVATED: *C. anacardioides*, 20 to 30 ft., Australia; *elegantissima*, 15 to 20 ft., Tropics; *grandis*, 20 to 30 ft., Zanzibar.

Cuphea—*Lythraceae*. Greenhouse evergreen flowering plants. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand. Position, 5 to 6 in. pots in greenhouse, or in beds outdoors in summer. Pot, March or April. Plant outdoors in June. Water moderately Oct. to March, freely afterwards. Temp., March to Sept. 60° to 70°, Sept. to March 50° to 55°.

PROPAGATION: By seeds sown in light soil in temp. 65° to 75° in March; cuttings of young shoots inserted in sandy soil in temp. 65° to 75° in March, April or Aug.

SPECIES CULTIVATED: *C. aequipetala*, purple, June, 2 ft., Mexico; *cyanea*, yellow and red, July, 2 ft., Mexico; *Hookeriana*, vermilion and orange, July, 2 to 3 ft.,

Mexico; *lanceolata*, blue, July, 18 in., annual, Mexico; *Llavea*, bright red, summer, 2 ft., Mexico; *micropetala*, scarlet, white and red, July, 1 ft., Mexico; *platycentra*, 'Cigar Flower' scarlet, black and white, July, 1 ft., Mexico.

Cupidone, see *Catananche caerulea*.

Cupid's Dart, see *Catananche*.

Cupressus (Cypress)—*Pinaceae* (or *Cupressaceae*). Hardy evergreen coniferous trees with small scale-like leaves, dark green or variegated with white or yellow. Some species formerly included in this genus have been transferred to *Chamaecyparis*.

CULTURE: Soil, deep, rich loam. Position, single specimens on lawns, in mixed shrubberies, etc. Plant, Sept. to Nov.

PROPAGATION: By seeds sown in pans of light soil in April, transplanting singly into small pots the following spring and planting out of doors a year afterwards; by cuttings in sandy soil in cold frame or under hand-light in Sept.

SPECIES CULTIVATED: *C. arizonica*, 30 to 40 ft., Arizona; *funbris*, 'Mourning Cypress', weeping habit, 40 to 50 ft., China; *Goveniana*, compact habit, 20 to 30 ft., California; *lusitanica*, 100 ft., Mexico; *macrocarpa*, 'Monterey Cypress', spreading habit, 60 to 90 ft., California; *sempervirens*, pyramidal habit, 50 to 60 ft., S. Europe, and vars. *horizontalis*, *indica*, *stricta*, etc.

Curculigo—*Amaryllidaceae*. Stove, stemless, evergreen plant. First introduced early nineteenth century.

CULTURE: Compost, equal parts lumpy peat and loam and little silver sand. Position, pots in moist plant stove. Pot, Feb. or March. Water moderately in winter, freely other times. Temp., Sept. to March 55° to 65°, March to Sept. 75° to 85°.

PROPAGATION: By suckers inserted in small pots of sandy soil in temp. 85° in March.

SPECIES CULTIVATED: *C. capitulata* (syn. *C. recurvata*), 'Weevil Plant', 3 to 4 ft. Trop. Asia, var. *variegata*, variegated foliage.

Curcuma—*Zingiberaceae*. Stove, fleshy-rooted perennials. Turmeric, used as a condiment and dye, is obtained from *C. longa*.

CULTURE: Compost, two parts peat, one part loam and a little sand. Position, pots in warm greenhouse, well drained. Temp., March to Oct. 65° to 75°, Oct. to March 60°. Pot in Feb. Water freely during growing season. Dry off tubers after foliage dies down.

PROPAGATION: By offsets in spring treated as tubers.

SPECIES CULTIVATED: *C. albiflora*, white, 2 ft., July, Ceylon; *longa*, 'Turmeric', yellow, 2 ft., E. Indies; *petiolata*, yellow, 1½ ft., Sept., Burma; *Roscoeana*, scarlet, 1 ft., Aug., Burma.

Currant, see *Ribes*; **Alpine-**, see *Ribes alpinum*; **American Black-**, see *R. americanum*; **Black-**, see *R. nigrum*; **Buffalo-**, see *R. aureum*; **Flowering-**, see *R. sanguineum*; **Red-**, see *R. rubrum*; **White-**, see *R. sativum*.

Curtonus—*Iridaceae*. Hardy cormous plants formerly included in *Antholyza*. Noteworthy for its arched, many-branched inflorescence.

CULTURE: Soil, light sandy. Position, sunny, well-drained borders, or pots in cool greenhouse. Plant 6 in. deep and 6 in. apart in border, or 6 in a 6-in. pot in Oct.

PROPAGATION: By offsets; seeds in slight heat in spring.

SPECIES CULTIVATED: *C. paniculatus* (syn. *Antholyza paniculata*), orange-red, July to Aug., 4 ft., Transvaal, Natal.

Cushion Pink, see *Armeria maritima* and *Silene acaulis*.

Custard Apple, see *Annona reticulata*.

Cyananthus—*Campanulaceae*. Hardy alpine herbaceous perennials. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy peat and leaf-mould. Position, sunny banks or crevices of rockeries. Plant, March or April. Protect in severe weather with ashes or leaves.

PROPAGATION: By cuttings of shoots 2 in. long inserted in sandy peat, in April, May or June, and kept under bell-glass; division of fleshy roots in March or April.

SPECIES CULTIVATED: *C. incanus*, blue, prostrate, June, Himalaya; *integer*, blue, mat-forming, June to July, Himalaya; *lobatus*, blue, June, prostrate, Himalaya, and vars. *alba*, white, *insignis*, larger flowers; *microphyllus*, blue, prostrate, June, Himalaya; *pedunculatus*, blue-violet, mat-forming, June and July, Nepal, and var. *crenatus*; *Sherriffiae*, blue, trailing, June, Himalaya.

Cyanastrum—*Cyanastraceae*. Warm-house herbaceous perennials with tuberous rootstock.

CULTURE: Compost, loam, leaf-mould and sand.

PROPAGATION: By division.

SPECIES CULTIVATED: *C. cordifolium*, blue or violet, 6 in., W. Trop. Africa.

Cyanella—*Amaryllidaceae*. Half-hardy bulbous plants with fragrant flowers. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy soil, one part leaf-mould or decayed cow manure. Position, pots 4½ in. in diameter, well drained, in cold frame or greenhouse. Pot, Oct., placing five bulbs 2 in. deep in each pot, and covering pots with peat until growth begins. Water moderately when bulbs begin to grow; keep bulbs dry Sept. to Jan.

PROPAGATION: By offsets in Nov.

SPECIES CULTIVATED: *C. capensis*, blue, July, 1 ft., Cape of Good Hope; *lutea*, yellow, July, 1 ft., Cape of Good Hope.

Cyathea (Tree Fern)—*Cyatheaceae*. Stove and greenhouse evergreen tree ferns. First introduced late eighteenth century.

CULTURE: Compost, peat and loam and an abundance of sand. Position, large pots or tubs, well drained, in shady stove, greenhouse or conservatory. Repot Feb. or March. Temp. stove, Sept. to March 50° to 65°, March to Sept. 65° to 75°. Greenhouse, Sept. to March 45° to 55°, March to Sept. 55° to 65°. Shade in summer essential. Water moderately Oct. to March, freely afterwards.

PROPAGATION: By spores sown at any time on surface of finely-sifted loam and peat in shallow, well-drained pans; cover with sheet of glass and keep moist in shady position in temp. 75° to 85°.

STOVE SPECIES CULTIVATED: *C. Dregei*, 10 to 12 ft., Trop. Africa; *insignis*, to 8 ft., Jamaica.

GREENHOUSE SPECIES CULTIVATED: *C. dealbata*, 10 ft. and more, New Zealand, etc.; *medullaris*, 'Sago Fern', 15 to 20 ft., New Zealand.

Cyathodes—*Epacridaceae*. Hardy, evergreen, dwarf flowering shrubs.

CULTURE: Soil, peaty, lime-free. Position, semi-shade or north aspect, cool.

PROPAGATION: Seeds taken when ripe; cuttings in July and Aug.

SPECIES CULTIVATED: *C. Colensoi*, white, berries red, 6 to 9 in., May to June, New Zealand; *divaricata*, pink or red berries, 3 to 4 ft., Tasmania; *empetrisolia*, white, fragrant, prostrate, May to June, New Zealand; *ericoides* (syn. *C. Leucopogon*), white, fragrant, May to June, New Zealand; *Fraseri*, white, fragrant, 6 in., May, New Zealand; *glauca*, white or pink berries, 2 to 3 ft., Tasmania; *parviflora*, deep red berries, 4 to 5 ft., Tasmania; *pumila*, red berries, dwarf, New Zealand; *robusta*, flowers inconspicuous, berries pink, dwarf shrubby habit, Chatham Islands, for sheltered gardens.

Cybistetes—*Amaryllidaceae*. Tender bulbous plant.

CULTURE: As *Brunsvigia*.

PROPAGATION: As *Brunsvigia*.

SPECIES CULTIVATED: *C. longifolia* (syn. *Ammocharis falcata*, *Brunsvigia falcata*), pale or dark pink, March, 9 in., S. Africa.

Cycas (Sago Palm)—*Cycadaceae*. Stove plants with ornamental, feather-shaped, dark green leaves.

CULTURE: Compost, two parts turfy loam, one part silver sand. Position, well-drained pots in moist plant stove. Repot, Feb. and March. Water moderately Oct. to March, freely afterwards. Temp., March to Sept. 75° to 80°, Sept. to March 55° to 65°. *C. revoluta* may stand outdoors in sheltered position from June to Sept.

PROPAGATION: By seeds sown 1 in. deep in light soil in temp. 85° to 90° in March or April; suckers obtained from base of plant inserted in small pots in temp. 80° to 85° at any time.

SPECIES CULTIVATED: *C. circinalis*, 8 ft., E. Indies; *revoluta*, 6 to 8 ft., China.

Cyclamen (Sowbread)—*Primulaceae*. Hardy and greenhouse, tuberous-rooted perennial flowering plants. First introduced late sixteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part leaf-mould and sand. Position, pots in greenhouse Sept. to May; cold frame other times. Repot, July or Aug.; corm to be above surface of soil. Water moderately until new growth begins, then increase supply, decreasing it when plants have ceased to flower, keeping roots nearly dry and cool May or July. Apply liquid manure when in flower. Temp., Sept. to April 50° to 55°. Corms should not be grown for more than two years. Best results obtained from seedling plants one year old. Shade from sun essential.

CULTURE OF HARDY SPECIES: Soil, rich, friable loam containing plenty of leaf-mould. Position, sheltered, partially shady nooks of rockery or in turf under trees. Plant, Aug. or Sept., 2 or 3 in. apart and 1½ in. deep. Top-dress with cow manure and rich soil annually after leaves die down, first removing old soil as far as corms. May also be grown in pots or pans in cold greenhouse or frame.

PROPAGATION: Greenhouse kinds by seed sown ¼ in. deep and 1 in. apart in well-drained pans of light soil in temp. of 55° Aug. to Nov., or Jan. to March; species by seeds sown similarly in cold frame in Oct. or Nov., transplanting seedlings following spring. Cover surface of soil in seed pans with layer of moss to keep soil uniformly moist. Seeds take several weeks to germinate.

GREENHOUSE SPECIES CULTIVATED: *C. persicum*, 'Florist's Cyclamen', white, purple and rose, leaves usually variegated with white, 6 to 12 in., Greece to Syria. There are many large-flowered hybrid strains in cultivation.

HARDY SPECIES CULTIVATED: *C. africanum*, red and white, autumn, 6 in., N. Africa; *Atkinsii*, purple and white, hybrid; *colum*, red, Feb. to Mar., 4 in., S. Europe to Persia; *graecum*, rose-red, autumn, 3 in., S.E. Europe; *hederifolium*, red or white, summer or autumn, Europe (Br.); *ibericum*, red, Feb. to Mar., 3 in., Caucasus; *repandum*, rosy-red, March to May, 4 in., Medit. Region.

Cycnoches (Swan Orchid)—*Orchidaceae*. An epiphytic genus with stoutly cylindrical pseudo-bulbs. The spikes are often pendent with numerous flowers. As in *Catasetum*, the sexes are in separate flowers, the female are more uniform than the males. There are two sections, one in which the lip is entire, the other in which it is divided into slender finger-like lobes in the male flowers. In both the column is slender and curved.

CULTURE: Compost, etc., as for *Catasetums*.

PROPAGATION: By division of plants when potting in spring.

SPECIES CULTIVATED: With entire lips—*C. chlorochilon*, large, yellow or yellowish-green, lip creamy-white with a black-green blotch, summer, Brazil, Demarara; *Loddigesii* (syn. *C. cucullatum*), large, greenish, suffused purple-brown, lip whitish, red spotted, summer, Brazil.

With divided lips, smaller flowers but more numerous: *Cooperi*, greenish and mahogany-red, lip marked with white, various, Peru; *Egertonianum*, greenish suffused dull purple, summer, autumn, Mexico, Guatemala; *Forgetii*, green, pale brown, summer, Peru; *maculatum*, yellowish or greenish-buff, spotted red-purple, lip white, summer, Mexico; *pentadactylon*, fragrant, yellowish-green,

whitish, barred and blotched brown, variable seasons, summer, Brazil; *peruviana*, pale green, spotted purplish-brown, lip white, summer, Peru.

Cydonia (Common Quince)—*Rosaceae*. A small, deciduous, much-branching tree from Persia and Turkistan, grown for its edible fruit, and as rootstock for pears. For flowering quince, see *Chaenomeles*.

CULTURE: Soil, ordinary. Position, sunny shrubberies or walls. Plant, Nov.

PROPAGATION: By seed, layers, cuttings or suckers.

SPECIES CULTIVATED: *C. oblonga* (syns. *C. vulgaris*, *Pyrus Cydonia*), to 20 ft., flowers white or pale pink, pear or apple-shaped fruits, fragrant.

Cymbalaria—*Scrophulariaceae*. Creeping herbaceous perennials, often included in the genus *Linaria*.

CULTURE: Soil, ordinary. Position, moist and partly shady; sunny or shady walls for *C. muralis* and *C. pallida*. Plant, autumn or spring.

POT CULTURE OF C. MURALIS: Compost, two parts loam, one part of equal proportions of dried cow manure, old mortar and sand. Sow seeds $\frac{1}{16}$ in. deep in 3 or 5 in. pots in March or April. Place pots in shady window or greenhouse until seedlings appear, then remove to light and suspend in a basket. Water moderately at first, freely afterwards; keep nearly dry during winter.

PROPAGATION: By division; seeds.

SPECIES CULTIVATED: *C. aequitriloba*, pale violet, summer, trailing, S. Europe; *hepaticifolia*, lilac, summer, trailing, France, Corsica; *muralis* (syn. *Linaria Cymbalaria*) 'Kenilworth Ivy', 'Ivy-leaved Toadflax', 'Mother o' Millions', lilac, summer, Europe (Br.); *pallida*, blue, summer, 3 ins., Italy; *pilosa*, lavender and yellow, summer, 2 to 3 ins., Italy.

Cymbidium—*Orchidaceae*. A genus of epiphytic, semi-epiphytic and terrestrial orchids; with exceptions the pseudo-bulbs are short, stout, clustered, sheathed and surmounted by long persistent leaves. The spikes are produced from the base of the pseudo-bulbs and in many carry large long-lasting flowers. On the whole the genus is of great horticultural value, and of late years an immense number of hybrids have been produced and, to an extent, superseded the species as a much greater variety of colour is present and the flowers appear in late autumn to April and May. These hybrids are so numerous and vary so greatly that if special colours are desired it is necessary either to see the flowers or secure authenticated varieties, or divisions. All, however, are as easily cultivated as the species.

CULTURE: Compost, largely of rough but fibrous loam, with a little sphagnum moss and finely broken potsherds. Peat may be added. Pots are suitable, tubs for large plants, drainage about 2 in. Repot, if necessary, in early spring, as growth appears, earlier if extra heat can be maintained. Usually growths or flower spikes are present through the winter and water must be given. Winter temp. should be 50° or a little higher, but falls to 45° or even lower do no harm if the atmosphere is kept fairly dry, and within reason the compost is dry. Admit night air whenever conditions are favourable. Syringe freely in summer, the temp. can then rise by sun heat to 70° to 80°. From April to September weak liquid manure may be sprinkled on the floor spaces in the evening.

PROPAGATION: By division of plants or healthy back bulbs may be removed and placed on compost, or potsherds, in a damp position. Pot when growth is seen.

SPECIES CULTIVATED: A selection—*C. Ballianum*, flowers 3 to 7, white, winter, spring, Burma, Annam; *Dayanum*, segments narrow, whitish with a purplish stripe, Assam, Annam; *Devonianum*, flowers small, many, greenish to purple, spring, Assam, Sikkim; *eburneum*, flowers 1 to 3, large, white, very fragrant, winter, early spring, N. India, Burma, var. *Dayanum*, marginal purple spots on lip; *ensifolium*, yellowish-brown, very fragrant, autumn, N. India; *erythrostylum*, glistening white, red column, and reddish stripes on lip, autumn, Annam; *Finlaysonianum*, tawny red, long pendent spikes, summer, Malaya, Borneo; *giganteum*, yellowish-green, striped red-brown, autumn, N. India, Annam; *grandi-*

florum (syns. *C. Griffithianum* and *C. Hookerianum*), large, green lip spotted red, winter, spring, Himalaya; *Pansonii* (syn. *C. mandaiianum*), tawny yellow, veined and suffused purplish-brown, winter, spring, Burma, Annam; *insigne* (syn. *C. Sanderi*), variable, white, suffused with rose-lilac, dotted in places with crimson, spikes erect, early spring, Annam; *Lowianum*, flowers 15 to 36, yellowish-green suffused with reddish-brown, lip widely bordered with crimson-red, spring, early summer, Burma, var. *concolor*, yellow, tinted green; *Parishii*, white, purple spotted chiefly on lip margins, summer, Burma, var. *Sanderae*, flowers 3 to 6, purple spots, bolder, Annam; *sinense*, very fragrant, like *ensifolium*, autumn, China; *tigrinum*, dwarf, 2 to 5 flowered racemes, yellowish, marked crimson, lip yellowish, striped crimson, summer, Burma; *Tracyanum*, large, very fragrant, yellowish with red-brown lines, lip cream colour spotted red, softly haired, autumn, Burma.

Cymbopogon—*Gramineae*. Stove ornamental flowering grass. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, pots in stove. Pot, March. Water freely March to Oct., moderately afterwards. Temp., March to Oct. 75° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By division in March.

SPECIES CULTIVATED: *C. Martinii*, to 2 ft., foliage lemon scented, India.

Cynara—*Compositae*. Coarse, hardy, herbaceous perennials. Immature flower heads of artichoke and blanched stalks and midribs of leaves of cardoon used as vegetables.

CULTURE OF CARDOON: Soil, light, deep, rich and moist. Position, open and sunny. Prepare trenches 2 ft. deep, 18 in. wide as for celery, in March. Fork 6 in. of rotted manure into the soil in bottom of trench and cover with 3 in. soil. Sow seed 20 in. apart in early May 1½ in. deep. Place a stake to each plant when a foot high, and secure the leaves loosely to this. Soak roots once a week with diluted liquid manure and water copiously. Blanch in Aug., winding brown paper round stems for 6 in. when leaves are tied together at top. Increase blanched area in 6 in. steps each week, covering paper with a hayband and mulch of soil. Plants are sufficiently blanched for cooking eight weeks after earthing up. Seeds may be sown two in a 3 in. pot filled with ordinary soil, placed in temp. 55° to 65° in March, hardened off in April, and planted out in May.

CULTURE OF GLOBE ARTICHOKE: Soil, deep, rich loam, liberally manured and trenched three spits deep. Position, open and sunny. Plant suckers, *i.e.* offshoots, 4 in. deep in triangular groups 9 in. from plant to plant, 2 ft. apart in rows 4 ft. asunder, early in April. Keep well watered first season. In Nov. surround each plant with dry litter and in severe weather cover with similar material, uncovering in mild weather. Fork surface over in March, and mulch with decayed manure. Apply liquid manure freely to established plants during summer. Gather flower heads for use when fully developed. Seaweed an excellent manure. Apply in spring. Replant bed every four years.

PROPAGATION: By suckers removed in Nov. and stored in boxes with a little soil in a cold frame and planted out in April. Seedlings are variable.

SPECIES CULTIVATED: *C. Cardunculus*, 'Cardoon', purple, Aug., 4 to 6 ft., S. Europe; *Scolymus*, 'Globe Artichoke', Sept., 3 to 6 ft., Europe.

Cynoglossum—*Boraginaceae*. Hardy perennials and alpiners.

CULTURE: Soil, well-drained loam with sand and leaf-mould. Position, sunny beds and rock gardens.

PROPAGATION: *C. Wallichii* by division. *C. amabile* is best treated as a biennial, raising a fresh stock each year from seed sown in a cold frame in March or April.

SPECIES CULTIVATED: *C. amabile*, blue, June, 2 ft., S.W. China; *Wallichii*, sky blue, summer, 8 in., Himalaya. See also *Omphalodes*.

Cynorchis—*Orchidaceae*. A genus of terrestrial orchids with fleshy or tuberous roots. Leaves deciduous in several species. The flowers have their labellums shaped much as those of *Calanthe*.

CULTURE: Compost, half fibrous loam, half osmunda fibre and sphagnum moss for the warm-growing kinds. Three parts loam, one part sphagnum moss, finely crushed potsherds added for the cool growing kinds which require a rather decided rest. Pans.

PROPAGATION: By division, if possible, in spring.

SPECIES CULTIVATED: *C. compacta*, small, clustered, white, cool, early spring, S. Africa; *grandiflora*, variable, greenish, lip rose-purple, spur slender, winter, Madagascar; *Lowiana*, greenish, lip purple, winter, Madagascar; *purpurascens*, flowers up to 25, greenish, lip purplish and whitish, basket, spring, Madagascar; *villosa*, lilac-purple, lip whitish, hairy, late summer, Madagascar.

Cypella—*Iridaceae*. Half-hardy bulbs. Suitable for cool greenhouse and outdoor culture. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, light, rich sandy. Position, sunny well-drained border. Plant, Sept. to Jan., placing bulbs 4 in. deep and 2 in. apart. Lift and replant bulbs annually. Mulch surface of bed in March with cow manure.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed cow manure. Pots, 4½ in. in diameter, well drained. Place five bulbs, 3 in. deep, in each pot in Nov., and cover with moss or leaves, in cold frames or under cool greenhouse stage until growth begins. Water moderately from time bulbs begin to grow until flowers fade, then gradually cease, keeping bulbs dry till Jan. Temp., Sept. to March 40° to 50°, other times 50° to 60°.

PROPAGATION: By offsets treated as advised for bulbs or by seeds sown as soon as ripe in a cool house.

SPECIES CULTIVATED: *C. Herbertii* (syn. *Tigridia Herbertii*), yellow, summer, 1 ft., S. America; *peruviana*, yellow and brown, summer, 1 ft., Peru; *plumbea*, greyish-blue and yellow, autumn, 3 ft., Brazil.

Cyperus (Galingale)—*Cyperaceae*. Greenhouse and hardy grass-like perennials.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part leaf-mould and sand. Position, pots in shady greenhouse. Water moderately in winter, freely other times. Repot, Feb. to March. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

CULTURE OF HARDY SPECIES: Soil, heavy loam. Position, margins of lakes, ponds, etc. Plant, Oct. to March.

PROPAGATION: By seeds sown in shallow boxes or pans of light soil in temp. 55° to 65° in March or April; division of roots in March or April.

GREENHOUSE SPECIES CULTIVATED: *C. alternifolius*, 'Umbrella Plant', 2½ ft., leaves green, Africa, vars. *variegatus*, leaves striped with white, *gracilis*, a dwarfer, more elegant form; *Haspan*, 1 to 3 ft., Trop. America, etc., var. *adenophorus*, 18 in.; *Papyrus* (syn. *Papyrus antiquorum*), 'Papyrus', 8 to 10 ft., leaves green, Trop. Africa.

HARDY SPECIES CULTIVATED: *C. esculentus*, 'Chufa', producing underground edible tubers, 2 to 3 ft., N. America, Europe and Asia; *longus*, 4 ft., Europe; *vegetus* (syn. *C. Eragrostis*), crowded heads of mahogany-coloured flowers, autumn and winter, Chile.

Cyphomandra—*Solanaceae*. Greenhouse evergreen shrub. Fruit, large, egg-shaped, red and edible, ripe in Aug. and Sept. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, pots in light, sunny greenhouse. Pot, March or April. Water moderately Oct. to March, freely afterwards. Temp., Oct. to March 45° to 55°, March to Sept. 55° to 65°. Prune plants into shape March or April.

PROPAGATION: By seeds sown ½ in. deep in light soil in temp. 75° to 85° in March or April; cuttings of side shoots 3 in. long inserted in sandy soil under bell-glass in temp. 75° to 80° in spring or early summer.

SPECIES CULTIVATED: *C. betacea*, 'Tree Tomato', purple and green, spring, 6 to 10 ft., S. America.

Cypress, see *Cupressus*; **Bald-**, see *Taxodium distichum*; **Montezuma-**, see *Taxodium mucronatum*; **-Spurge**, see *Euphorbia Cyparissias*; **-Vine**, see *Quamoclit pennata*.

Cypripedium (Lady's Slipper Orchid; Moccasin Flower)—*Orchidaceae*. A generic name which has unfortunately been misused. Led away by the pouch-like formation of their labellums four different genera have become familiarised under this name. The so-called Selenipediums of orchid collections are often included in this genus. The name Cypripedium was first applied to a hardy species (correctly it should have been Cypripedium) characterised by plicate deciduous leaves, which, more or less, ascend the flowering stems. The species are distributed in both hemispheres. The greenhouse and stove plants known as Cypripediums should correctly be termed Paphiopedilums. All are Eastern, from India to Hong Kong, their leaves are of greater consistency than those of Cypripediums and persistent, conduplicate, often mottled. The so-called Selenipediums (correctly Phragmipedium of gardens) differ again, their leaves are more numerous, not tessellated, narrower and tapered. The stems bear several flowers more or less in succession. Some Paphiopedilums bear 3 to 5 flowers on their scapes but in Phragmipedium the dorsal sepal, though it may be attenuated, is on the whole smaller than that in Paphiopedilums and the flowers are never warted or spotted. Of true Selenipediums there are only three or four species and they have never appeared in cultivation. Botanical differences in floral structure also serve to differentiate the four genera. The greater number of Cypripediums should be hardy but in their home the seasons are more consistent than ours and growths are delayed till frost is past. Snow often affords complete protection to the roots in their native habitat. Here an early start is often fatal.

CULTURE: Compost, two parts peat, one part leaf-mould, one or two parts fibrous loam and an addition of sharp sand and chopped sphagnum moss. A north-west aspect is often preferable to one which might appear more favourable. A mulching of leaves may be given in winter. Species may also be grown in pans in a frost-proof frame or house during winter and placed out of doors in the summer, not too sunny.

PROPAGATION: By division of the plants (the rhizomes often branch).

SPECIES CULTIVATED: A selection—*C. arietinum*, yellowish-green, shaded brown and whitish, the lateral sepals are free, they form one organ in others, spring to summer, Canada; *Calceolus*, dark brown, lip yellow, spring, summer, England, Europe, N. Asia, var. *pubescens*, large, greenish-yellow or yellowish, lip sometimes marked with red-brown, early summer; *candidum*, solitary, greenish-brown, lip white or rose-veined, early summer, N. America; *japonicum*, solitary, large, greenish-white, red dotted, lip white and crimson, summer, Japan; *macranthum*, variable, large, 1 to 2 red-purple, lip pink and purple-red, summer, N. Asia; *Reginae* (syn. *C. spectabile*), large, white or rose-flushed, lip rose to purplish-rose, succeeds in damp places or bog gardens, summer, N. America, Canada; *tibeticum*, large solitary, greenish-yellow and dark purple, lip blackish-purple in front, summer, Tibet, China.

Cyrilla—*Cyrillaceae*. Hardy evergreen flowering shrub. Flowers borne in tufts on the ends of old wood. Seldom planted. First introduced mid-eighteenth century.

CULTURE: Soil, loam and peat. Position, warm, sheltered nooks. Plant, Sept. or April.

PROPAGATION: By cuttings in silver sand under bell-glass in temp. 55° to 65°.

SPECIES CULTIVATED: *C. racemiflora*, 'Leatherwood', white, summer, 6 ft., Southern U.S.A.

Cyrtanthus—*Amaryllidaceae*. Greenhouse bulbous plants with fragrant flowers. First introduced mid-eighteenth century.

CULTURE: Compost, two parts loam, one part sand and peat. Position, well-drained pots on shelf in light greenhouse. Pot bulbs in Oct. to Nov., 2 in. deep.

Water freely March to Oct., very little other times. Temp., Nov. to April 50° to 55°, April to Nov. 60° to 65°.

PROPAGATION: By offsets in Nov. or seeds sown as soon as ripe in a temp. of 55° to 60°.

SPECIES CULTIVATED: *C. angustifolius*, orange, summer, 1 ft., S. Africa; *carneus*, red, summer, 1 ft., S. Africa; *collinus*, red, Aug., 1 ft., S. Africa; *epiphyticus*, red, 1½ ft., Natal; *Flanaganii*, yellow, 9 in., S. Africa; *Mackenii*, white, Dec. to March, 1 ft., Natal, var. *Cooperi* (syn. *C. lutescens*), yellow; *obliquus*, yellow and red, 9 to 24 in., S. Africa; *O'Brienii*, pale scarlet, 1 ft., S. Africa; *parviflorus*, bright red, 1 ft., S. Africa; *rhododactylus*, rose, 6 in., S. Africa; *sanguineus*, red, summer, 1 ft., S. Africa.

Cyrtomium—*Polypodiaceae*. Greenhouse ferns.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand. Pot, March. Water freely in summer, moderately in winter. Shade from strong sun. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°. These ferns also make good room plants provided the atmosphere is not too dry.

PROPAGATION: By division of roots in March, also by spores sown on fine sandy peat in temp. 60° at any time.

SPECIES CULTIVATED: *C. caryotideum*, 1 to 2 ft., fronds drooping, Japan, India; *falcatum* (Holly fern), 2 to 3 ft., fronds spreading or erect, Asia.

Cyrtopodium—*Orchidaceae*. About thirty terrestrial and epiphytic species. First introduced early nineteenth century. Pseudo-bulbs are fusiform, short or tall; scapes bracteate produced from their base with the young growth, often tall and paniced. Leaves deciduous in some. *C. Andersonii* and *punctatum* are the finest species in cultivation.

CULTURE: Compost, as for Cymbidiums but with more peat or osmunda fibre, a little sphagnum and crushed potsherds. Pots or pans, well drained. Pot March or April. Water freely April to Aug., moderately Aug. to Nov., afterwards keep nearly or quite dry. Expose to full light in autumn; winter temp. 60°, summer 70° to 80°. Resting period when bulbs are matured in a light position.

PROPAGATION: By division of plants large enough in spring.

SPECIES CULTIVATED: *C. Andersonii*, tall, paniced, yellow and greenish-yellow, lip rich yellow, many, 1½ in. diameter, spring, early summer, Brazil, W. Indies, var. *cardiochilum* (syn. *C. cardiochilum*), flowers more closely set; *punctatum* (syn. *C. speciosum*), yellow, red spotted and marked, lip yellow and chestnut, crest and base spotted red, bracts greenish-yellow and often spotted bright red-brown, spring, S. America; *virescens*, greenish-yellow and red-chocolate, lip marked red-purple, spring, Brazil.

Cystopteris (Bladder Fern)—*Polypodiaceae*. Hardy deciduous ferns.

CULTURE: Soil, rich, deep, sandy loam, freely mixed with pieces of limestone or dried mortar. Position, well-drained, shady, sheltered rockery. Plant, March or April. Water moderately in dry weather.

POT CULTURE: Compost, two parts good loam, one part leaf-mould mixed with old mortar or sand. Position, well-drained, cold frame or cold greenhouse in shade. Repot, March or April. Water freely April to Sept., moderately Sept. to Nov., nearly dry afterwards.

PROPAGATION: By spores sown on surface of fine sandy soil in shallow boxes or pans, cover with sheet of glass and place in cold frame at any time; division of plants in March or April.

SPECIES CULTIVATED: *C. bulbifera*, 6 to 12 in., N. America; *fragilis*, 6 to 8 in., fronds deeply cut, widely distributed and variable, Europe, Newfoundland, Arizona, and var. *alpina*, small finely cut fronds, Asia Minor; *montana*, 6 to 8 in., Europe and N. America.

Cytisus (Broom)—*Leguminosae*. Greenhouse and hardy deciduous and evergreen flowering shrubs. 'Genista' of florists is *C. canariensis*. The named varieties, in great numbers, provide wonderful colouring.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts turfy loam, one part lumpy peat and sharp sand. Position, pots in greenhouse. Pot, May or June. Prune shoots to within 2 in. of base directly after flowering and place plants in temp. 50° to 55° to make new growth before repotting. Place plants in sunny place outdoors from end July to Oct. to ripen growth. Water freely March to May, moderately during May and June, freely June to Nov., moderately afterwards. Apply weak liquid or artificial manure to plants during the time they are in bloom. Temp., Nov. to Feb. 45° to 50°, Feb. to May 50° to 55°, May to June 55° to 60°.

CULTURE OF HARDY SPECIES: Soil, ordinary. Brooms will thrive in hungry light and stony soils and enjoy dry root conditions and full sun. Position, sunny rockery for *C. Ardoinii*, *C. kewensis*, etc.; shrubbery borders for *C. multiflorus*, *C. praecox*, *C. purpureus*, *scoparius*, var. *Andreanus*, and choice kinds; rough banks, woodlands, etc. for *C. scoparius*. Plant, Oct. to Dec. Prune directly after flowering, shortening old shoots to base of promising young ones but avoid cutting into old wood. Transplant best when young. *C. praecox*, *C. purpureus* and *C. scoparius* var. *Andreanus* make excellent pot plants for flowering early in cold greenhouse.

PROPAGATION: Greenhouse species by cuttings of young shoots 3 in. long with small portions of branches attached in sandy soil in well-drained pots under bell-glass in temp. 75° to 80° in March, April or May; seeds sown $\frac{1}{4}$ in. deep in well-drained pots of light soil in temp. 65° to 70° in March; hardy species by seeds outdoors in March or April; August cuttings in sandy soil; grafting in March or April. Seeds of common broom may be scattered broadcast on banks or in woodlands.

GREENHOUSE SPECIES CULTIVATED: *C. canariensis* (syn. *Genista canariensis*), yellow, fragrant, spring and summer to 6 ft., Canary Is., and var. *ramosissimus*, small leaved; *filipes*, white, March, 4 to 6 ft., Canary Is.; *fragrans* (syn. *Genista fragrans*), yellow, summer, 2 to 3 ft., Canary Is., var. *elegans*, yellow, 4 ft.

HARDY SPECIES CULTIVATED: *C. albus*, 'White Spanish Broom', white, May, 6 to 10 ft., Spain; *Ardoinii*, yellow, spring, 4 to 6 in., Maritime Alps; *Beanii*, deep yellow, May, 6 to 18 in., hybrid; *Battandieri*, 10 ft., newer species, hardy in south, golden, scented, June, foliage and shoots covered with silky hairs, Morocco; *Burkwoodii*, 4 to 5 ft., flowers red, hybrid; *decumbens*, yellow, May to June, 4 to 6 in., S. Europe; *hirsutus*, yellow, 1 to 2 ft., S. Europe; *kewensis*, creamy white, May, prostrate, hybrid; *monspessulanus*, yellow, May, 5 to 7 ft., S. Europe; *multiflorus* (syn. *C. albus*), 'White Spanish Broom', white, May, to 10 ft., Spain, N. Africa; *nigricans*, yellow, June, 4 to 6 ft., Europe; *praecox*, creamy yellow, May, 4 to 6 ft., hybrid; *purgans*, deep yellow, April to May, 3 to 4 ft., France and Spain; *purpureus*, purple, May, 1 to 1½ ft., E. Europe; *ratibonensis*, yellow, May, 4 to 6 ft., Europe; *scoparius*, 'Common Broom', yellow, April to July, 5 to 10 ft., Europe (Br.), var. *Andreanus*, yellow and red; *sessilifolius*, yellow, June, 5 to 6 ft., S. Europe and N. Africa; *versicolor*, yellowish-purple, May, 2 to 3 ft., hybrid.

Daboecia—*Ericaceae*. Evergreen flowering shrub of heath-like appearance.

CULTURE: Compost, sandy peat and loam free from lime. Best planted in clumps 15 in. apart each way. Position, sunny banks or rockeries. Plant, Sept., Oct., March or April.

PROPAGATION: By cuttings inserted in sandy soil in summer under hand-light; layers of shoots in autumn.

SPECIES CULTIVATED: *D. azorica*, 6 in., bright rose, June, Azores; *cantabrica* (syn. *D. polifolia*, *Menziesia polifolia*), 'Irish Heath', 'St. Dabeoc's Heath', 18 in., purple, July, Connemara and S.W. Europe. There are various forms: *alba*, white; *atropurpurea*, rich, reddish purple; and *bicolor*, some flowers white, others purple, and some mixed on the same plant.

Dacrydium—*Taxaceae* (or *Podocarpaceae*). Rather tender, ornamental, evergreen trees. First introduced early nineteenth century.

CULTURE: Soil, sandy peat. Position, as specimens in open places or upon lawns in mildest districts only. Plant, Sept. to Oct. and April to May.

PROPAGATION: By cuttings of ripened wood in cold frame in Aug. or Sept.; seeds sown in sandy peat in pans in cool greenhouse during Feb. or March.

SPECIES CULTIVATED: *D. cupressinum*, 'New Zealand Rimu', 80 to 100 ft., New Zealand; *Franklinii*, 'Huon Pine', 80 to 100 ft., Tasmania.

Dactylis (Cock's-foot Grass)—*Gramineae*. Hardy ornamental grass.

CULTURE: Soil, ordinary. Position, margins of flower beds or borders in sun or shade, or mixed with bedding plants. Plant, Oct. or April, 3 to 6 in. apart.

PROPAGATION: By division of plants in Oct. or April.

SPECIES CULTIVATED: *D. glomerata variegata*, silver and green variegation, 6 to 8 in., Britain.

Daemonorops—*Palmae*. Stove, ornamental-leaved, climbing palms. Useful for table decoration.

CULTURE: Compost, equal parts loam, peat, leaf-mould and sand. Position, pots in a young state; in beds or tubs with shoots trained up pillars when large. Pot or plant in March. Water freely in summer, moderately in winter. Syringe daily; moist atmosphere essential. Temp., March to Oct. 75° to 85°, Oct. to March 60° to 65°.

PROPAGATION: By seeds sown in sand or sandy soil in spring.

SPECIES CULTIVATED: *D. Lewisianus*, Penang; *melanochaetes*, Malaya; *palembanicus*, Sumatra; *periacanthus*, Sumatra; *plumosus*, India.

Daffodil, see *narcissus PseudoNarcissus*; -**Orchid**, see *Ipsea speciosa*.

Dahlia—*Compositae*. Half-hardy, herbaceous, tuberous-rooted perennials. First introduced late eighteenth century.

TYPES—**Show**: Flower, large, circular; florets, quilled; colour, all one tint. **Fancy**: Flower, large, circular; florets, quilled; colour, florets tipped, striped or flaked different tint to ground colour. **Cactus**: Flower, high in centre, circular; florets, long, narrow, pointed, not quilled or fluted, reflexed at edges. **Pompon**: Flower, small, circular, florets and colours like those of show and fancy types. **Single**: Flower, circular; florets, broad, flat, eight in number, overlapping each other, rounded, recurving at tips. **Collarette**: Flowers, single, with 'collar' of very shortened florets; outer florets broad and flattened. **Peony-flowered**: Flower, semi-double; outer florets, broad; inner ones, short and narrow. **Charm and Miniature Peony-flowered**: Flower, semi-double; florets, broad and more or less flattened; plants bushy and branching; colours very varied. **Decorative**: Flower, semi-double; florets, flat. **Anemone-flowered**: Flowers, double; outer florets, broad and flattened; inner florets, short and densely packed. **Star**: Flowers, semi-double; florets, long, narrow, pointed, reflexed at edges and incurving towards centre. **Orchid**: Flowers, single; florets, broad, flattened and twisted. **Dwarf Bedding**: Flowers, single or semi-double; florets, broad and more or less flattened; habit, dwarf and branching, very free flowering. Forms of garden origin include Cactus, Semi-cactus, Decorative (tall), Pompon, Charm, Dwarf Cactus (medium), Bedding, double and single (dwarf).

OUTDOOR CULTURE: Soil, ordinary, well enriched with manure. Position, open sunny beds or borders. Plant tubers 3 in. deep in April, or start them in pots in temp. 55° in March, planting outdoors in May or June. Thin shoots to three on each plant in July; flower buds to one on each shoot in Aug. Apply liquid manure occasionally in July, Aug. and Sept. Lift and store tubers in frost-proof place in Oct., just covering them with soil or coconut-fibre refuse. Cut down stems to within 6 in. of tubers before lifting.

CULTURE IN POTS: Compost, two parts turfy loam, one part decayed manure. Place tubers in well-drained 6 in. pots in March, in temp. 55°. Water moderately and keep close to glass. Transfer to 8 in. pots in May. Stand plants outdoors in June. Apply liquid manure in July. Thin shoots to three on each plant, flower

buds to one on each shoot in Aug. Withhold water after flowering and store away in frost-proof place.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 65° to 75° in March; cuttings of shoots 3 in. long issuing from tubers, inserted in 2 in. pots of sandy soil, in temp. 65° to 70° in Feb., March or April; division of tubers in spring.

SPECIES CULTIVATED: *D. coccinea*, scarlet, autumn, 4 ft., parent of Single Dahlia; *coronata*, scarlet, Mexico; *excelsa*, purplish-pink, summer, 15 to 20 ft.; *gracilis*, orange-scarlet, autumn, 5 ft.; *imperialis*, white, lilac and red, Oct., 10 to 12 ft.; *Juarezii*, parent of Cactus Dahlias, scarlet, autumn, 3 ft.; *Merckii*, lilac and yellow, Oct., 3 ft.; *pinnata* (syn. *D. variabilis*), parent of Show, Fancy and Pompon Dahlias, scarlet, autumn, 4 ft.

Daisy, see *Bellis*; **-Bush**, see *Olearia Haastii*.

Dalechampia—*Euphorbiaceae*. Stove flowering evergreen shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould and sand. Position, shady part of plant stove. Pot, March. Water moderately Sept. to April, freely afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings inserted in sandy peat under bell-glass in March, April or May, in temp. 85°.

SPECIES CULTIVATED: *D. Roezliana*, yellow, insignificant, bracts rose, 12 in., Mexico; *scandens*, 18 in., Trop. America; *spathulata*, 12 to 18 in., Mexico, and var. *rosea*.

Damask Rose, see *Rosa damascena*.

Damasonium (Starfruit)—*Alismaceae*. Shallow-water aquatics closely allied to *Alisma*.

CULTURE: Position, wet soil or shallow water.

PROPAGATION: Seed sown in March in shallow pans of loam just covered with water.

SPECIES CULTIVATED: *D. Alisma*, white or yellow flowers, star-like fruit, very rare British plant.

Dame's Rocket or Dame's Violet, see *Hesperis matronalis*.

Damson, see *Prunus domestica* var. *insititia*.

Danae—*Liliaceae*. Hardy evergreen berry-bearing shrub with bamboo-like growth. Introduced early eighteenth century.

CULTURE: Soil, ordinary, medium or light, moist. Position, under shade of trees; good carpeting shrub. Plant in autumn.

PROPAGATION: By seeds sown outdoors in autumn; by division in spring.

SPECIES CULTIVATED: *D. racemosa* (syn. *Ruscus racemosus*), 'Alexandrian Laurel', greenish-white flowers, succeeded by red berries, 2 to 3 ft., sprays used for indoor winter decoration, S. Europe.

Dandelion, see *Taraxacum*.

Daphne—*Thymelaeaceae*. Greenhouse and hardy deciduous and evergreen shrubs with fragrant flowers.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part peat and sand. Position, airy greenhouse from Sept. to June, outdoors June to Sept. Pot, Feb., pinch out points of young shoots in June. Water moderately Sept. to April, freely afterwards. Temp., Sept. to March 40° to 50°, March to Sept. 55° to 65°.

CULTURE OF HARDY SPECIES: Soil, sandy peat. Position, drooping over front of rockeries for trailing species; summit of rockery or open border for erect species. Plant, Oct., Nov., March or April. *D. Mezereum* is very free flowering, easy of culture and can be raised from seed.

PROPAGATION—Greenhouse species: By cuttings of side shoots in well-drained pots or pans of sandy peat under bell-glass in temp. 50° to 55°; layers in March

or April; grafting on *D. Laureola* and *D. pontica* in spring. Hardy species: By layering shoots in autumn and seed sown as soon as ripe.

GREENHOUSE SPECIES CULTIVATED: *D. odora*, purple, Jan. to March, 2 to 3 ft., Japan, very strongly fragrant, bushes will succeed in the open in the extreme S.W.

HARDY SPECIES CULTIVATED: *D. Blagayana*, white, March to April, fragrant, 9 to 12 in., E. Europe; *Burkwoodii*, 3 ft., creamy white flushed pink, April, May, hybrid; *Cneorum*, 'Garland Flower', pink, May, fragrant, 10 to 12 in., Cent. and S. Europe; *collina*, purplish rose, March to June, fragrant, 2 to 3 ft., Italy and Asia Minor; *hybrida*, reddish-purple, spring and autumn, fragrant, 2 to 4 ft., hybrid; *Laureola*, yellowish-green, Feb. to March, fragrant, S. and W. Europe (Br.); *oleoides*, purplish-rose to white, 2 to 3 ft., S. Europe; *petraea*, bright pink, June, fragrant, 3 to 5 in., S. Tyrol; *pontica*, yellowish-green, April, fragrant, 2 to 3 ft., Asia Minor; *retusa*, rose, purple and white, May, fragrant, 1 to 2 ft., W. China.

HARDY DECIDUOUS SPECIES CULTIVATED: *D. acutiloba*, 4 ft., white, July, W. China; *alpina*, white, May to June, fragrant, 6 to 18 in., Alps; *caucasica*, white, May to June, fragrant, 3 to 4 ft., Caucasus; *Mezereum*, 'Mezereon', purplish-red or white, Feb. to March, fragrant, 3 to 5 ft., Europe and Siberia, and vars. *alba*, white, *grandiflora*, autumn flowering.

Daphniphyllum—*Euphorbiaceae*. Hardy evergreen shrubs. Flowers unisexual and sexes on separate plants, unattractive. First introduced late nineteenth century.

CULTURE: Soil, ordinary rich. Position, moist shady borders or shrubberies. Plant, Nov.

PROPAGATION: By cuttings of nearly ripe wood in close frame in July.

SPECIES CULTIVATED: *D. humile*, blue-black fruits, 1½ to 2 ft., Japan; *macro-podum*, blue-black fruits, 8 to 12 ft., Japan.

Darling River Pea, see *Swainsona coronilliflora*.

Darlingtonia—*Sarraceniaceae*. Hardy, herbaceous, insectivorous plant. Pitchers borne on summit of leaves, hood-like, bright green, mottled with white and pink. First introduced mid-nineteenth century.

GREENHOUSE CULTURE: Compost, equal parts peat, chopped sphagnum, sharp sand and sifted loam. Position, shady greenhouse, plunge pots in live sphagnum. Pot, Feb. or March. Water freely during growing season. Syringe daily March to Sept.

OUTDOOR CULTURE: Compost, spongy fibrous peat and chopped sphagnum moss. Position, damp, by side of stream, or in bog exposed to sun, but sheltered from cold winds. Plant, March or April. Protect in winter with hand-light.

PROPAGATION: By seeds sown on surface of mixture of fibrous peat, charcoal, sphagnum and sand in a pan standing partly in water and covered with a bell-glass in cool greenhouse in April or May; division of side shoots inserted in small pots at any time of year.

SPECIES CULTIVATED: *D. californica*, 'Californian Pitcher Plant', yellow and green, April, 12 in., California.

Darwinia—*Myrtaceae*. Greenhouse evergreen shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat and sand. Position, well-drained pots in airy greenhouse. Pot firmly in Feb. or March. Water moderately Sept. to March, freely March to Sept. Prune, Feb. or March. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By cuttings of young shoots 2 or 3 in. long inserted in sandy peat under bell-glass in temp. 40° to 50° in April or May.

SPECIES CULTIVATED: *D. diosmoides*, white, 3 ft., Australia; *fascicularis*, red, 3 to 5 ft., Australia; *fimbriata*, rose, June, 5 ft., Australia; *Hookeriana*, resembles *macrostegia* but usually smaller; *macrostegia* (syn. *Genetivis tulipifera*), crimson, May, 3 ft., Australia.

Dasyliirion—*Liliaceae*. Greenhouse evergreen plants. Leaves, glaucous green, with spiny margins. First introduced early nineteenth century.

CULTURE: Compost, two parts loam and peat, one sand. Position, pots or tubs in airy greenhouse, dwelling-rooms or outdoors in beds May to Sept. Pot firmly Feb. or March. Water very little Oct. to March, freely afterwards. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By seeds sown in sandy peat in well-drained pans or pots under bell-glass in temp. 50° to 60° in March, April or May.

SPECIES CULTIVATED: *D. acrotriche*, 6 to 8 ft., Mexico; *glaucophyllum*, 10 ft., Mexico; *Hookeri*, 3 ft., Mexico; *serratifolium*, Mexico.

Date Palm, see *Phoenix dactylifera*; **-Plum**, see *Diospyrus Lotus*.

Datisca—*Datisceae*. Hardy herbaceous perennial. Male and female flowers borne on separate plants. Leaves, pinnate, green. First introduced mid-eighteenth century.

CULTURE: Soil, deep rich, ordinary. Position, open and sunny border. Plant, Oct., Nov., March and April. Female plant most effective.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in fine soil outdoors in March, April or May, transplanting seedlings to permanent positions any time.

SPECIES CULTIVATED: *D. cannabina*, 'False Hemp', greenish-white, summer, 3 to 6 ft., W. Asia.

Datura (Trumpet Flower)—*Solanaceae*. Half-hardy and greenhouse annuals, shrubs and trees.

CULTURE OF ANNUAL SPECIES: Soil, light sandy. Position, sunny borders outdoors. Plant, May.

CULTURE OF SHRUBBY SPECIES: Compost, equal parts loam, fibrous peat, well-rotted manure and silver sand. Position, pots, tubs, or borders well drained in sunny greenhouse. Pot or plant, March. Prune freely Sept. or Oct. Water very little Oct. to March, freely afterwards. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°. Place plants outdoors in sunny position June to Sept. Apply liquid manure occasionally while plants are in flower.

PROPAGATION: Annuals by seed sown $\frac{1}{8}$ in. deep in light sandy soil in well-drained pots in temp. 55° to 65° in March or April, and transfer the seedlings to small pots until planting time; shrubby species by cuttings of shoots 6 in. long inserted in sandy soil under bell-glass in temp. 65° to 75° in spring or autumn.

ANNUAL SPECIES CULTIVATED: *D. ceratocaula*, white, July, 3 ft., Trop. America; *Metel* (syn. *D. fastuosa*), blue and white, summer, 2 ft., Tropics; *Stramonium*, 'Thorn Apple', white, July, 2 ft., Britain, etc.

SHRUBBY SPECIES CULTIVATED: *D. arborea*, white, Aug., 7 to 10 ft., Peru; *chlorantha*, 'Yellow-flowered Thorn-apple', native country unknown; *cornigera*, 'Horn of Plenty', creamy white, summer, 10 ft., Organ Mountains; *meteloides* (syn. *D. Wrightii*), bluish-violet, summer, 2 ft., California; *sanguinea* (syn. *Brugmansia sanguinea*), orange-yellow, summer, 4 to 6 ft., Peru; *suaveolens*, white, fragrant, Aug., 8 to 10 ft., Mexico, and var. *Knightii*.

Daucus—*Umbelliferae*. Hardy annual or biennial. A well-known edible rooted vegetable. Reputed to be first introduced into England by the Flemings in time of Queen Elizabeth. Types—Shorthorn: Roots short, conical. Stump-rooted: Roots medium, blunt at ends. Intermediate: Root spindle-shaped, midway in length between a shorthorn and long-rooted carrot. Long-rooted: Roots long, and tapering.

CULTURE: Soil, deep and well manured in previous year. Fresh manure causes forking. Make early sowings of shorthorn type in sheltered border in Feb. Sow intermediate and long-rooted types in March to July, sowing main crops for storing in late May. Thin plants 4 to 6 in. apart when 2 in high. Store in clumps or in frost-proof shed in boxes of sand or soil. Crop matures in 20 to 24 weeks. For exhibition, long-rooted types are sown in specially prepared stations, a good friable compost being used to fill holes made by a crowbar.

CULTURE IN FRAMES: The shorthorn or French forcing types may be sown in 6 in. of good compost over a hotbed in frames from Oct. or Jan. to Feb. Sufficient water will run down the lights in winter but beds must be kept moist in spring, soaking with warm water. Ventilate even in mid-winter, closing the lights in the afternoon; protect with straw nets when frosty.

SPECIES CULTIVATED: *D. Carota*, white, summer, Europe (Br.), var. *sativa*, 'Carrot'.

Davallia—*Polypodiaceae*. Stove and greenhouse evergreen ferns.

CULTURE OF STOVE SPECIES: Compost, two parts loam, one part leaf-mould, peat, pounded charcoal and sand. Pot, Feb., March or April. Position, pots or hanging baskets in light part of plant stove. Water moderately Oct. to Feb., freely afterwards. Temp., Sept. to March 55° to 60°, March to Sept. 65° to 75°.

CULTURE OF GREENHOUSE SPECIES: Compost, as above. Pot, March or April. Position, pots or baskets in partial shade. Water moderately Sept. to March, freely afterwards. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By spores sown on surface of sandy peat in pans under bell-glass in temp. 55° to 75° at any time; division of rhizomes in Feb. or March.

STOVE SPECIES CULTIVATED: *D. denticulata*, fronds to 2 ft. long; *hymenophylloides*, creeping, 9 to 12 in., Ceylon, Java, etc.; *solida*, to 2 ft., Malaya.

GREENHOUSE SPECIES CULTIVATED: *D. bullata*, 'Squirrel's-foot Fern', dwarf, creeping, Japan; *canariensis*, 'Hare's-foot Fern', 1½ ft. long, Canary Is. to Spain and N. Africa; *dissecta*, trailing Java; *pyxidata*, to 1 ft., Australia.

Davidia—*Nyssaceae*. Handsome, hardy, deciduous tree, unusual subject with the bearing of a lime tree. First introduced late nineteenth century.

CULTURE: Soil, ordinary. Position, as specimens on lawns or at back of shrub borders. Plant, Nov.

PROPAGATION: By seed sown in pans in cold frame in Feb., or cuttings of ripened wood in Oct.

SPECIES CULTIVATED: *D. involucrata*, large creamy-white bracts, May, 40 to 65 ft., Cent. and W. China, and var. *Vilmoriniana*, glabrous leaves.

David's Harp, see *Polygonatum multiflorum*; -root, see *Celastrus scandens*.

Daviesia—*Leguminosae*. Greenhouse evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat and silver sand. Position, well-drained pots in airy greenhouse. Pot firmly March or April. Water very little Oct. to March, moderately other times. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By cuttings of firm young shoots inserted in sand under bell-glass in temp. 50° to 55° in spring; seeds sown ⅛ in. deep in sandy peat in temp. 55° in March.

SPECIES CULTIVATED: *D. alata*, 'Australian Hop', yellow, summer, 3 ft., Australia; *cordata*, yellow, summer, 3 ft., Australia; *latifolia*, orange-yellow, summer, 2 to 5 ft., Australia; *ulicina*, yellow, summer, 2 ft., Australia.

Day Flower, see *Commelina*; -Lily, see *Hemerocallis*.

Dead Nettle, see *Lamium*.

Decaisnea—*Berberidaceae* (or *Lardizabalaceae*). Hardy deciduous ornamental shrub. First introduced late nineteenth century.

CULTURE: Soil, rich loamy. Position, sunny shrubberies sheltered from north and east winds. Plant, Nov.

PROPAGATION: By seeds sown in pans of sandy soil in Feb. or March.

SPECIES CULTIVATED: *D. Fargesii*, yellowish-green, large dull blue fruits, 3 ft. pinnate leaves, 7 to 10 ft., W. China.

Deciduous Cypress, see *Taxodium distichum*.

Decodon—*Lythraceae*. Handsome shrubby perennial for shallow water, with purple flowers and willow-like leaves.

CULTURE: Soil, ordinary. Position, pond margin. Plant, spring.

PROPAGATION: Divisions or soft cuttings in very moist soil.

SPECIES CULTIVATED: *D. verticillatus* (syn. *Nesaea verticillata*), 'Swamp Loose strife', 'Water-Willow', rose-purple, July to Sept., 8 ft., N. America.

Decumaria—*Saxifragaceae* (or *Hydrangeaceae*). Hardy, deciduous, fragrant, flowering twiner. First introduced late eighteenth century.

CULTURE: Soil, light rich. Position, against south or west walls, arbours or trellis work. Plant, Oct. to Dec. Prune away weak and dead shoots in Feb.

PROPAGATION: By cuttings of shoots inserted in ordinary soil under hand-light in shady position outdoors in summer.

SPECIES CULTIVATED: *D. barbara*, white, June, 10 to 20 ft., United States.

Deer Fern (*Blechnum spicant*); **-Grass** (*Rhexia virginica*).

Deinanthé—*Saxifragaceae* (or *Hydrangeaceae*). Herbaceous perennial plants related to Hydrangea.

CULTURE: Soil, sandy peat. Position, cool, north aspect or shade, not exposed to morning sun.

PROPAGATION: By seed; careful division of roots in spring when growth commences.

SPECIES CULTIVATED: *D. caerulea*, blue, 12 in., June, China.

Delonix—*Leguminosae* (or *Caesalpinaceae*). Stove evergreen flowering tree with graceful, fern-like, green leaves. First introduced early nineteenth century.

CULTURE: Compost, two parts peat or loam, one part leaf-mould, half a part silver sand. Position, pots in light part of stove or outdoors during July and Aug. Pot, Feb. or March. Water freely March to Oct., moderately afterwards. Temp., March to Oct. 70° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By seeds sown in light, sandy soil in temp. of 75° to 85° in spring; cuttings of short young shoots inserted singly in small pots filled with pure sand under bell-glass in temp. 75° to 85° in summer.

SPECIES CULTIVATED: *D. regia* (syn. *Poinciana regia*), 'Peacock Flower', 'Flamboyant', crimson, summer, 20 to 30 ft., Madagascar. See also *Caesalpinia*.

Delosperma—*Aizoaceae*. Greenhouse succulent plants formerly included in *Mesembryanthemum*.

CULTURE: As *Mesembryanthemum*.

PROPAGATION: As *Mesembryanthemum*.

SPECIES CULTIVATED: *D. echinatum* (syn. *Mesembryanthemum echinatum*), yellow, Aug., 1 ft., S. Africa; *robustum*, much branched shrub to 10 in., flowers reddish-gold above, red below, S. Africa.

Delphinium (Larkspur)—*Ranunculaceae*. Hardy annuals and herbaceous perennials. Showy plants for border culture.

CULTURE OF ANNUAL SPECIES: Soil, ordinary, rich. Position, open beds or borders. Sow seeds $\frac{1}{8}$ in. deep where plants are to flower in April, or in light soil in shallow boxes in temp. 55° in March, pricking out seedlings when large enough to handle and transplanting, outdoors in May.

CULTURE OF PERENNIAL SPECIES: Soil, deep, rich. Position, sunny beds or borders. Plant 3 ft. apart in Sept., Oct., March or April. Cut down flower stems in Oct. Feed liberally with liquid manures in summer, and mulch with decayed manure in early spring. Lift and replant every three years in March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in April, or in pans or boxes of light soil in temp. 55° in March; cuttings of young shoots, 3 in. long, inserted in 2 in. pots of sandy soil in cold frame in spring; division of roots in Sept. or March.

ANNUAL SPECIES CULTIVATED: *D. Ajacis* (syn. *D. Gayanum*), blue, white or rose-blue, summer, 1 to 2 ft., Europe; *Consolida*, blue, summer, 2 ft., Europe; *orientale*, 'Rocket Larkspur', violet, white or rose, 1 to 2 ft., E. Europe. Many beautiful strains of annual kinds to be found in trade lists.

PERENNIAL SPECIES CULTIVATED: *D. Brunonianum*, light purple, 12 to 18 in.,

Tibet; *cardinale*, scarlet, summer, 3 to 6 ft., California; *cashmerianum*, blue, July, 18 in., Kashmir; *cheilanthum*, dark blue, summer, 2 to 3 ft., Dahuria, var. *formosum* (syns. *D. Belladonna*, *D. Bellamosum*), rich blue; *elatum*, blue, June, 2 to 3 ft., Alps; *grandiflorum* (syn. *D. chinense*), blue or white, June to Sept., 1 to 3 ft., Siberia; *nudicaule*, red, Aug., 12 to 18 in., California; *Pylzowii*, violet blue, summer, 6 to 10 in., China; *Ruytii*, reddish or pink, summer, 2 to 4 ft., hybrid; *tatsienense*, azure blue, summer, 12 to 18 in., China; *trolliifolium*, bright blue, April to May, 1½ to 3 ft., N.W. America; *Zalil*, yellow, summer, 6 ft., Afghanistan. See trade lists for varieties. The popular garden delphiniums are hybrids between several species such as *D. elatum*, *D. cheilanthum*, *D. formosum*, etc.

Dendrobium—*Orchidaceae*. Probably 1000 species are included in this widely-spread Eastern genus and naturally considerable variation is present in both the flower and plants. Some very small, tufted in habit with stems rather than pseudo-bulbs, some resemble *Bulbophyllums*, others have stem-like pseudo-bulbs several feet in height, usually with hard persistent leaves. A number have distinctly noded stems, with membranous leaves often nearly or quite deciduous. Flowers may be produced from the nodes as in *D. nobile*, in twos or threes to a considerable number, axillary and then often solitary, from or near the apices of the pseudo-bulbs often in many flowered spikes. In many of the hard-bulbed, apical-flowering kinds 3 or 5 spikes may be produced together, or some, or all of the eyes may remain dormant until favourable conditions supervene. This character occurs in many far-eastern species and also in the Burmese forms, with many flowers in thyrs-like formation. It is, however, present in other species. Many beautiful and free-flowering hybrids have been obtained, chiefly from *D. nobile*, and special varieties of that species with *D. aureum*, *Wardianum*, *pendulum*, *Findlayanum* and between the hybrids themselves. Great variation exists. Treatment should be as for *D. nobile*, but the winter night temp. can be slightly higher.

CULTURE: General compost, three parts of osmunda fibre to one part of sphagnum moss, rather more moss for any kinds of soft texture. Pots or pans, well drained and as small as the plant size allows should be used. The shorter-growing species may be suspended, the pendent-growing kinds suspended in baskets. So varied is the genus, and so widely distributed that only general directions can be given. Much will be gained by studying the character of the individual species. Shading is required in summer for the majority, not heavy, and very light for the hard-bulbed, hard-leaved kinds. Expose to full light in autumn, especially the deciduous kinds. Water freely in summer, when the temp. for the majority can rise to 85° by sun-heat, with a humid atmosphere in the day. With exceptions the far eastern species (Borneo, Java, etc.) require a winter night temp. of 65° to 70° with moderate humidity, deciduous kinds, especially those from Burma, a more decided rest in winter, a minimum of 50°. In none allow the pseudo-bulbs to shrivel or the leaves approach flaccidity.

PROPAGATION: By division of plants. By young plants produced on the pseudo-bulbs in some species, taken off when roots are seen. Some of the noded stems may be cut in pieces with not less than two nodes, laid on sand or coconut fibre, in shallow pans or boxes and placed in a propagating case with bottom heat.

SPECIES CULTIVATED: A selection—*D. aggregatum*, dwarf, bright yellow, decided rest, spring, Burma, N. India, and var. *majus*; *albo-sanguineum*, creamy-white, lip with crimson blotch, large, spring, Moulmein; *amethystoglossum*, small, numerous, white, lip amethyst, autumn, winter, Philippines; *atroviolaceum*, creamy-white, purple spotted, lip violet-purple, spring, various seasons, New Guinea; *aurantiacum* (syn. *D. chryseum*), orange-yellow, stems slender, spring, Assam, Burma; *aureum* (syn. *D. heterocarpum*), from nodes, amber-yellow and velvet-brown, fragrant, spring, Ceylon, Burma, India; *Bensoniae*, from upper nodes, white, lip with two maroon blotches, spring, Burma; *bigibbum*, apical spikes, magenta-purple, autumn, winter, N. Australia; *Bronckartii*, flushed rose, season various, Annam; *Brymerianum*, 3 to 5 golden, lip with a large beard-like fringe, spring, Burma; *chrysanthum*, from nodes, orange-yellow, lip with two maroon blotches,

basket, spring, autumn, N. India, Burma; *chrysotoxum*, yellow-orange, apical spikes, severe rest, spring, Burma, var. *suavissimum* (syn. *D. suavissimum*), fragrant, maroon blotch on lip; *clavatum*, golden, lip with maroon blotch, from upper parts of stem, summer, Assam; *Coelogyne*, solitary, large, greenish-yellow, lip dull purple, raft, autumn, various seasons, Burma; *crepidatum*, from nodes, rose-pink, winter, spring, Burma; *crumenatum*, 'Pigeon Orchid', one or two from bare elongations of the bulbs, white, pink-flushed, fugitive, fragrant, various seasons, Malaya; *crystallinum*, from nodes, white, tipped magenta, spring, summer, Moulmein; *cymbidioides*, 5 to 12, not large, yellowish, purplish marks on lip, spring, various seasons, Java, Sumatra; *Dearei*, 5 to 12, or more, clustered, white, lip with green, summer, autumn, Philippines; *densiflorum*, orange-yellow in thyrses, spring, Assam, Burma; *Devonianum*, stems pendulous, from nodes, creamy-white, magenta, orange and yellow, basket, spring, India, Burma; *Falconeri*, solitary, large, white, rose-flushed, amethyst and orange, never allow to get really dry, tilted basket, spring, summer, Assam, Burma; *falcorostrum*, very fragrant, white or purple dotted, Australia; *Farmeri*, yellow, flushed pink to rose, spring, early summer, India, Burma; *fimbriatum*, from upper parts of stem, 5 to 15, orange-yellow, spring, summer, Nepal, Burma, var. *oculatum*, lip with maroon blotch; *Findlayanum*, from nodes, whitish, tipped magenta, lip with orange centre, winter, spring, Burma; *formosum*, large, white, orange-yellow in lip, fragrant, autumn, Burma, Assam, Andaman Isles, var. *giganteum*, larger, Burma; *gratiosissimum*, from upper nodes, white and rose-purple, spring, Burma; *Griffithianum*, near *D. densiflorum*, racemes longer, spring, summer, Burma, var. *Guibertii* (syn. *D. Guibertii*), brighter; *Harveyanum*, golden-yellow, petals and lip fringed, spring, Burma; *infundibulum*, white, lip stained yellow, no decided rest, spring to summer, Burma; *Jamesianum*, near *infundibulum*, but stain is usually cinnabar red, Burma; *Johnsoniae*, pure white, purple marked on lip, in apical spikes, summer to autumn, New Guinea; *Kingianum*, small, purplish, spring, Australia, var. *album*, white; *lituiflorum*, from indistinct nodes, rose-purple, purple, spring, Assam, Burma; *Loddigesii*, creeping, from nodes, rose-lilac, purplish-orange, shallow pan or raft, spring, China, Yunnan; *luteolum*, pale yellow, from upper nodes, spring, Moulmein; *Lyonii*, 15 to 30, chestnut rose, give full light, decided rest, erroneously known as *D. acuminatum*, early summer, Philippines; *Macarthiae*, 2 to 5, whitish, rose-pink, purple, a moist warm atmosphere, careful shading, spring, summer, Ceylon, national flower of Ceylon; *moschatum*, large, from near apices, yellowish, flushed rose, lip with two blackish blotches, spring, summer, Burma, var. *Calceolaria*, lip more slipper shaped, apricot or copper colour, usually smaller; *nobile*, beautiful and variable, parent of many hybrids, from nodes, whitish, passing to rose or amethyst, lip purple on disk, winter to spring, N. India, China, Burma vars. *album*, white, and *Cooksonianum*, petals very similar to lip, Many other named vars.; *ochreatum* (syn. *D. Cambridgeanum*), from nodes, orange-yellow, lip with maroon blotch, spring, N. India; *Parishii*, from nodes, purplish-rose, lip with two purplish blotches, decided rest, spring, Burma; *pendulum* (syn. *D. crassinode*), from nodes, white, tipped purple, lip orange-yellow, white and purple, spring, Burma; *phalaenopsis*, very variable 5 to 20 from apices, rose-red to magenta-purple, late summer, autumn, N. Australia, New Guinea, var. *Schneiderianum*, a type with larger flowers and longer spikes, very light shading; *Pierardii*, from nodes, blush white, rose to primrose yellow on lip, basket, winter to spring, N. India, Burma; *pulchellum* (syn. *D. Dalhousieanum*), 5 to 12, large, from upper parts of stout stems, yellowish, shaded rose, lip with two maroon-crimson blotches, spring, summer, Burma, N. India; *regium*, rose colour, near *D. nobile*, summer, Lower Hindustan; *Sanderæ*, clustered, white, lip purple-lined, variable, autumn, Philippines; *sanguinolentum*, clustered, fawn, tipped purple, summer, autumn, Malacca; *senile*, yellow, 1 to 2, plant white-haired, spring, Moulmein; *speciosum*, whitish, spotted purple, many, in apical spikes, decided rest, various seasons, Australia; *spectabile*, yellow, gold and crimson-red, segments twisted, winter, New Guinea; *superbiens*, crimson, purple, near *D. phalaenopsis*, autumn, winter, N. Australia; *superbum*, from indistinct nodes, large,

variable, magenta-rose-purple, basket, spring, Philippines, Malacca; *teretifolium*, white, 10 to 20, basket, summer, autumn, Australia; *thyrsiflorum*, white, lip yellow, in thyrses, spring, Burma; *tortile*, white, rose-flushed, lip yellowish, purple, from nodes, spring, summer, Burma, Siam; *Victoriae Reginae*, 3 to 5, whitish to purplish-blue, raft or fern stem, summer, Philippines; *Wardianum*, white, amethyst purple, lip yellow, white, with two crimson-red blotches, large, from nodes, basket, winter, spring, Assam, Burma, var. *giganteum*, larger, richly coloured; *Williamsonii* (syn. *D. cariniferum*), fawn-yellow, whitish, lip reddish, spring, Assam, Burma.

Dendrochilum—*Orchidaceae*. About 150 epiphytic species. Pseudo-bulbs small usually clustered, and single leaved. Flowers small, numerous, the rachis often pendulous from an erect, laterally inclined, slender peduncle. Sometimes included in the genus *Platyclinus*.

CULTURE: Compost, two to three parts of osmunda fibre cut fine to one part of sphagnum moss with pounded potsherds and a very little addition of half-decayed oak leaves. Pans which can be suspended, free drainage. Water freely when growing, fairly frequently in winter. The greater number require a winter night temp. of 65°, 70° to 85° in summer. Position near the glass.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: A selection—*D. Cobbianum*, creamy-white, autumn, Philippines; *cucumerinum*, greenish-yellow, autumn, winter, Philippines; *fili-forme*, 'Golden Chain Orchid', yellow, fragrant, early summer, Philippines; *glumaceum*, cream or whitish, very fragrant, spring, Philippines; *latifolium*, creamy-white, tinted green, spring, Philippines; *uncatum*, green to brown, winter, Philippines.

Dendromecon (Tree Poppy)—*Papaveraceae*. Rather tender, semi-woody, deciduous shrub. First introduced mid-nineteenth century.

CULTURE: Soil, light and unenriched, with sand and mortar rubble. Position, borders at the foot of south walls. Plant, Nov.

PROPAGATION: By cuttings of well-ripened growth placed singly in sandy soil in small pots during July and Aug. They should be placed in a propagator with a little bottom heat till rooted.

SPECIES CULTIVATED: *D. rigida*, yellow, summer, fragrant, 2 to 10 ft., California.

Dentaria (Toothwort)—*Cruciferae*. Hardy perennials and alpiners.

CULTURE: Soil, peaty loam with leaf-mould and sand. Position, moist shady banks and margins of woodland. Plant, Oct. or March.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *D. bulbifera* (syn. *Cardamine bulbifera*), pale purple, April, 1 to 2 ft., Britain; *digitata*, purple-rose, April to May, 9 to 18 in., Alps, Pyrenees; *enneaphylla*, creamy-white, April to May, 9 to 12 in., Alps.

Deodar, see *Cedrus Deodara*.

Desert Rod, see *Eremostachys*.

Desfontainea—*Loganiaceae*. Rather tender evergreen flowering shrub. Leaves oval, dark shiny green, with spiny margins resembling those of holly. First introduced mid-nineteenth century.

OUTDOOR CULTURE: Compost, equal parts peat and loam. Position, sheltered borders outdoors, or against south wall. Plant, Oct., Nov. or April.

GREENHOUSE CULTURE: Compost, equal parts peat, loam, charcoal and sand. Position, well-drained pots, tubs or borders. Pot or plant, March or April. Water moderately Oct. to March, freely afterwards.

PROPAGATION: By cuttings inserted in sandy peat and loam in well-drained pots under bell-glass or hand-light in temp. 55° to 65° in spring.

SPECIES CULTIVATED: *D. spinosa*, scarlet and yellow, waxy 2 in. flowers, 6 ft., spreading, Chile and Peru.

Desmodium—*Leguminosae*. Hardy and stove flowering perennials and semi-

woody shrub dying to ground level each winter. Leaves of stove species (*D. motorium*) animated, especially in sunshine.

CULTURE OF STOVE SPECIES: Compost, equal parts peat, loam and silver sand. Position, pots in plant stove. Pot, Feb. or March. Water moderately Oct. to Feb., freely afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, open sunny borders. Plant, March.

CULTURE OF SHRUBBY SPECIES: Soil, light or chalky, well drained. Position, sunny banks. Plant, Nov. to March.

PROPAGATION: Stove species by seeds sown in light sandy soil in temp. 75° to 80° in Feb. or March, or by cuttings inserted in sandy peat under bell-glass in temp. 75° to 80° in March or April; hardy perennial species by division in March; hardy shrubby species by division in spring.

STOVE SPECIES CULTIVATED: *D. motorium* (syn. *D. gyrans*), 'Telegraph Plant', violet, July, 2 to 3 ft., India.

HARDY PERENNIAL SPECIES CULTIVATED: *D. canadense*, 'Tick Trefoil', purple, July, 3 ft., N. America.

HARDY SHRUB SPECIES CULTIVATED: *D. tiliacifolium*, pale lilac to deep pink, Aug. to Oct., 2 to 4 ft., Himalaya. See also *Lespedeza*.

Deutzia—*Saxifragaceae* (or *Hydrangeaceae*). Hardy, deciduous, easily grown, flowering shrubs of great beauty.

CULTURE: Soil, ordinary. Position, sunny well-drained border. Plant, Oct. to Feb. Prune, June, shortening shoots that have flowered only.

POT CULTURE OF *D. gracilis*: Compost, two parts loam, one part decayed manure and sand. Pot, Oct. or Nov. Position, cold frame Nov. to Feb.; greenhouse, Feb. to May; outdoors afterwards. Water very little Oct. to Feb., moderately Feb. to April, freely April to Oct. Temp., Feb. to May 55° to 65°. Plants will flower in cold greenhouse without heat if desired. Plant out deutzias that have flowered in heat in open garden for a year, then lift and repot.

PROPAGATION: By cuttings of young shoots 3 in. long in sandy soil under bell-glass in cold frame in June or July, or firm young shoots 10 to 12 in. long in ordinary soil in Nov. to Jan.

SPECIES CULTIVATED: *D. gracilis*, 'Japanese Snowflower', white, April, 4 ft., Japan, and var. *aurea*, leaves yellow; *kalmiaeflora*, 5 ft., charming graceful hybrid with saucer-shaped carmine flowers, June; *Lemoinei*, white, May, 7 ft., hybrid; *longifolia*, purplish-rose, June, 4 to 6 ft., W. China, var. *Veitchii*, probably the best-coloured deutzia; *magnifica*, a fine hybrid, double white, June, 8 ft.; *purpurascens*, white and purple, June, 6 to 7 ft., W. China; *rosea*, pinkish, 4 ft., a beautiful hybrid, vars. *carminea*, *campanulata*, *venusta*; *scabra* (syn. *D. crenata*), white, June, 7 ft., Japan, and vars. *Fortunei*, *mirabilis*, *Watereri*; *setchuenensis*, white, May to June, 6 ft., China; *Sieboldiana*, white, June, 3 to 4 ft., Japan; *Vilmoriniae*, white, 8 ft., W. China; *Wilsonii*, white, May to June, 4 to 6 ft., hybrid.

Devil-in-a-Bush, see *Nigella damascena*.

Devil's Apple, see *Mandragora officinarum*; **-Walking Stick**, see *Aralia spinosa*.

Dewberry, see *Rubus caesius*.

Diacrium—*Orchidaceae*. A small epiphytic genus, allied to *Epidendrum*. Pseudobulbs hollow, ribbed, peduncles terminal.

CULTURE: Compost and general conditions as for *Cattleyas* but give more exposure especially in autumn, and a decided rest in winter. Baskets or pans, which can be suspended near the glass, are preferable.

PROPAGATION: By division if plants are large enough.

SPECIES CULTIVATED: *D. bicornutum* (syn. *Epidendrum bicornutum*), 5 to 20, white, with a few purple spots on lip, summer, autumn, W. Indies, Brazil, var. *indivisum*, white, smaller.

Dianella (Flax Lily; Paroo Lily)—*Liliaceae*. Slightly tender fibrous-rooted perennials. First introduced early eighteenth century.

OUTDOOR CULTURE: Soil, equal parts loam and peat. Position, sheltered borders in S. of England only. Plant, Oct., March or April.

INDOOR CULTURE: Compost, equal parts peat, loam and leaf-mould, and sand. Position, well-drained pots in unheated greenhouse. Pot, Feb., March or April. Water moderately Sept. to March, freely afterwards.

PROPAGATION: By division in Oct. or March; seeds in heat in spring.

SPECIES CULTIVATED: *D. caerulea*, blue, May, 2 ft., Australia, Tasmania; *ensifolia* (syn. *D. nemorosa*), blue or white, spring, 2 to 6 ft., S.E. Asia; *laevis*, blue, spring, 2 ft., Australia, Tasmania.

Dianthera (Water Willow)—*Acanthaceae*. Greenhouse flowering plant.

CULTURE: Compost, equal parts fibrous loam, peat, leaf-mould and sand. Position, well-drained pots in light airy greenhouse June to Sept.; warm greenhouse Sept. to June. Pot, March to April. Water moderately Sept. to March, freely other times. Temp., Sept. to March 55° to 65°, March to June 65° to 75°. Stop young plants once or twice during early stages of growth to promote bushy habit. Apply liquid or artificial manure twice a week to plants when established or in flower.

PROPAGATION: By cuttings of young shoots inserted in pots of sandy soil under bell-glass or in propagating frame, temp. 70° March to June.

SPECIES CULTIVATED: *D. nodosa*, pink, winter, 18 in., India.

Dianthus—*Caryophyllaceae*. Annual, biennial and perennial plants, many of which are fragrant.

TYPES: Border Carnations subdivided into—Cloves; Selfs; Fancies; White-ground Fancies; Yellow-ground Fancies; Flakes and Bizarres; Yellow-ground Picotees; White-ground Picotees. Margaret or Marguerite Carnations, a race of hybrids with fragrant fringed flowers of all shades. Jacks, coarse-growing, mostly singles. Tree, Perpetual or American Carnations, habit tall, flowers self-coloured, striped or flaked appearing all the year round. Malmaison Carnations, habit sturdy, flowers large, self-coloured. Pinks sub-divided into—Garden, Show and Laced. Sweet Williams, Show-type—smooth-edged petals with dark centres; Auricula-eyed, smooth-edged petals with white eye, surrounded crimson or other tints.

CULTURE OF CARNATIONS AND PICOTEES: Soil, three parts decayed turfy loam, one part equal parts well-decayed cow manure and sand for exhibition kinds, good, well-drained, ordinary, rich soil for border kinds. Position, sunny beds or borders. Plant 12 in. apart in Oct. or March. Top-dress with manure or compost in April. Thin flower buds to one on each shoot in June, and in July place rubber band round calyx of flower to prevent bursting. Stake flower stems in May. Apply liquid manure once a week when buds form. Shade exhibition blooms from hot sun. Pot culture, compost as advised for exhibition culture. Position, cold frame Oct. to Feb., cold greenhouse afterwards. Plant singly in 3 in. pots in Oct., then two in 8 in. pot in Feb. Water moderately Oct. to March, freely afterwards. Apply liquid manure once a week April to July. Thin buds to three on each shoot in May. Give plenty of air.

CULTURE OF TREE OR PERPETUAL CARNATIONS: Insert cuttings of side shoots 3 in. long from midway up the flowering stems with a few of the lower leaves removed in well-drained pots of pure sand, Nov. to March. Place in box or propagator, keep moist and shaded from sun till rooted. Temp. 50° and slight bottom heat. When rooted, transfer to small pots in compost of two parts sandy loam and one part leaf-mould and sand. Stand in temp. 45° to 55° till pots are filled with roots, then transfer to larger pots in compost of four parts fibrous loam, one part mortar rubble, sand and leaf-mould. Add carnation fertiliser at rate suggested by makers. Bonemeal, 4 oz. to a bushel of soil, is sometimes used instead of the fertiliser. Stop or pinch shoots at third or fourth joint after first potting; again at intervals when shoots are a few inches long till early July. Feed

with liquid manure when well rooted. Place outdoors May to Sept. Winter temp. 45° to 55°. Ventilate freely in fine weather. Syringe daily during spring and summer. May also be grown outdoors like border carnations.

CULTURE OF MALMAISON CARNATIONS: Layer shoots in July. Plant rooted layers in small pots in Aug. or Sept., place in cold frame or greenhouse and transfer to 5 or 6 in. pots in Oct. Water moderately during winter. Temp. 40° to 45°. Feed with liquid manure when buds form. Shade in spring from sun. Admit air freely on fine days.

CULTURE OF PINKS: Soil, ordinary, rich. Position, sunny borders. Plant 9 in. apart in autumn or spring. Thin shoots to four on each plant to ensure fine blooms. Feed with liquid manure in May and June.

CULTURE OF ANNUAL AND BIENNIAL SPECIES: Sow seeds in gentle heat in spring, harden off seedlings in cold frame and plant out in beds and borders in May to flower same season; or sow in open border in April and plant out in July to flower following year. Sweet Williams, although perennial, are usually grown as biennials.

CULTURE OF PERENNIAL SPECIES: Soil, sandy loam. Position, sunny rockeries or borders. Plant, Oct. or March.

PROPAGATION: Carnations, pinks and picotees by seeds in sandy soil in heat or in cold frame in spring; pinks by cuttings or pipings in cold frame in summer; perpetual carnations by cuttings as already explained; border carnations and picotees by layering in July or Aug. Annuals and biennials by seed; perennials by seed in cold frame in spring or cuttings in July.

SPECIES CULTIVATED: *D. alpestris*, pink, summer, 6 in., Alps; *alpinus*, rose to crimson, summer, 3 to 4 in., Alps; *anatolicus*, pale pink and yellow, summer, 1 to 3 ft., Asia Minor; *arenarius*, white, summer, 6 in., N. Europe; *barbatus*, 'Sweet William', various, 1 to 2 ft., S. Europe; *callizonus*, pale pink and maroon, 2 to 4 in., Alps; *carthusianorum*, crimson, 1 to 2 ft., Europe; *Caryophyllus*, 'Clove Pink', 'Carnation', various, 1½ to 2 ft., Britain, Europe; *chinensis*, 'Chinese or Indian Pink', various, 6 to 12 in., biennial, Portugal to China and Japan, var. *Heddewigii*, hardy annual pink of gardens; *cruentus*, scarlet, summer, 18 in., E. Europe; *deltoides*, 'Maiden Pink', rose and white, summer, 6 to 9 in., Britain to Japan; *fimbriatus*, rose, summer, 12 to 16 in., Europe and Asia; *fragrans*, white, summer, 6 in., Caucasus; *glacialis*, 'Glacier Pink', purple, summer, 4 in., S. Europe; *graniticus*, pink, June to Sept., trailing, Europe; *gratianopolitanus* (syn. *D. caesioides*), 'Cheddar Pink', rose, fragrant, July, 3 to 6 in., Britain to Germany and S. France; *Knappii*, yellow, May to July, 6 in., Europe; *microlepis*, pink or white, summer, cushion, Bulgaria; *monspessulanus*, pink, June to July, 9 to 12 in., S. Europe; *neglectus*, rose, summer, 2 in., Pyrenees; *Noeanus* (syn. *Acanthophyllum spinosum*), white, fragrant, June to July, 6 to 9 in., densely tufted, S. Europe to S.W. Asia; *petraeus*, rose, summer, 6 in., E. Europe; *plumarius*, 'Cottage Pink', various, 12 in., Britain, E. Europe; *squarrosus*, white or pink, summer, 9 to 12 in., Russia, Siberia; *Sternbergii*, rose, summer, 6 in., S. Europe; *superbus*, 'Fringed Pink', rose, summer, 9 to 18 in., Europe; *sylvestris*, 'Wood Pink', rose, May to July, 9 to 12 in., Alps. There are many hybrid forms of *Dianthus* in cultivation.

Diapensia—*Diapensiaceae*. Hardy, dwarf, evergreen, tufted plants. First introduced early nineteenth century.

CULTURE: Soil, deep sandy peat mixed with stones. Position, sunny rock garden. Plant, March to April. Water freely June to Aug.

PROPAGATION: By division of plants in March and April.

SPECIES CULTIVATED: *D. lapponica*, white, July, 3 in., Northern Regions.

Diascia—*Scrophulariaceae*. Half-hardy annual. First introduced mid-nineteenth century.

INDOOR CULTURE: Compost, two parts sandy loam and one part leaf-mould and sand. Sow seeds in a temp. of 60° in March or April. Transplant seedlings when the third leaf forms, four or five in a 4½ in. pot. Grow on shelf near the glass.

Water freely when flower buds form. Give weak liquid manure occasionally. Shoots may require to be supported by twiggy sticks.

OUTDOOR CULTURE: Sow seeds in temp. of 60° in March or April. Transplant in pots or boxes when large enough to handle. Gradually harden off in cold frame, and plant out in good ordinary soil in sunny position at the end of May.

SPECIES CULTIVATED: *D. Barberae*, rosy pink, summer, 1 ft., S. Africa.

Dicentra—Fumariaceae. Hardy, herbaceous, tuberous and fibrous-rooted perennials. Formerly known as *Dielytra*. First introduced early eighteenth century.

CULTURE: Soil, deep, light, rich, sandy. Position, warm sheltered borders; dwarf species on rockeries. Plant, Oct., Nov., March or April. Protect during winter by covering with layers of ashes or manure. Top-dress with decayed manure in March.

POT CULTURE OF D. SPECTABILIS: Compost, equal parts loam, leaf-mould and sand. Pot, Oct. or Nov. Position, cold frame Oct. to Feb.; greenhouse Feb. to May, afterwards planting out in borders. Water moderately when new growth begins, freely when in full growth. Apply liquid manure once or twice weekly when flower buds appear.

FORCING: Pot, Oct. Place in cold frame till Jan. Transfer to temp. 55° to 65° in Jan. After forcing, plant out in open border. Plants should only be forced in pots one year.

PROPAGATION: By dividing the crowns in Feb. to April; cuttings of fleshy roots 2 in. long inserted in sandy soil in temp. 55° in March or April.

SPECIES CULTIVATED: *D. canadensis*, white, May, 6 in., N. America; *chrysantha*, 'Golden Eardrops', deep yellow, May to June, 2 to 3 ft., California; *Cucullaria*, 'Dutchman's Breeches', white and yellow, spring, 6 in. United States; *eximia*, reddish purple, April to Sept., 12 in., N. Carolina; *eximia* × *formosa*, reddish purple, April to Sept., 9 to 12 in., garden hybrid; *formosa*, red, May, 6 in., N. America; *peregrina*, white, May to June, 3 in., Japan; *spectabilis* (syn. *Dielytra spectabilis*), 'Chinaman's Breeches' or 'Bleeding Heart', 'Lyre Flower', rosy crimson, spring and summer, 2 ft., Siberia and Japan, var. *alba*, white form.

Dichaea—Orchidaceae. Small tufted epiphytal orchids. Stems slender, erect or pendulous, clothed with small leaves. Flowers small, axillary, solitary. The lip corner often prolonged into a short tendril.

CULTURE: Compost, two parts of osmunda fibre and one part of sphagnum moss, small pans, which can be suspended and tilted for the pendulous kinds. Pots or pans for the erect growing. Position not too sunny, shade carefully in summer. Water freely in summer, moderately in winter. No decided rest. Winter temp. for the species given 60° to 65° in a moist atmosphere, summer up to 80°.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *D. picta*, green and purple, winter, Trinidad; *Bradeorum*, green, red-flecked, whitish, summer, Costa Rica; *glauca*, whitish, autumn, W. Indies; *vaginata*, white, small, summer, Mexico.

Dichelostemma, see *Brodiaea*.

Dichorisandra—Commelinaceae. Stove ornamental-leaved and flowering perennials.

CULTURE: Compost, one-third each of peat, loam and leaf-mould, and a little silver sand. Position, pots in shady part of stove. Pot in March. Water freely March to Oct., moderately afterwards. Syringe daily in spring and summer. Temp., March to Oct. 75° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By seeds in spring; division in March.

SPECIES CULTIVATED: *D. mosaica*, leaves green marked with white, 2 ft., Peru; *pubescens taeniensis*, leaves striped with white, 2 ft., Brazil; *thyrsiflora*, blue, autumn, 5 to 10 ft., Brazil; *vittata*, leaves purplish-green, striped white, Brazil.

Dicksonia—Dicksoniaceae. Greenhouse tree ferns. First introduced late eighteenth century.

CULTURE: Compost, peat and loam and an abundance of sand. Position, large pots or tubs well drained in shady greenhouse or conservatory. Repot, Feb. to March. Water moderately Oct. to March, freely afterwards. Syringe trunks daily March to Sept. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°, or more from sun heat with shade and ventilation. Shade in summer essential.

PROPAGATION: By spores sown at any time on surface of finely sifted loam and peat in well-drained pots covered with a sheet of glass and kept moist.

SPECIES CULTIVATED: *D. antarctica*, 'Australian Tree Fern', 18 to 20 ft., Tasmania; *squarrosa*, 'New Zealand Tree Fern', 15 to 20 ft., length of frond nearly equalling height of plant, New Zealand.

Dicranostigma—*Papaveraceae*. Hardy perennial herbs.

CULTURE: Any good loamy soil, well drained, and a sunny, warm position in border or rock garden.

PROPAGATION: By seeds sown in spring.

SPECIES CULTIVATED: *D. Franchetianum*, yellow, 12 to 18 in., summer, China; *lactuoides*, yellow, 12 in., June to July, Himalaya.

Dictamnus—*Rutaceae*. Hardy herbaceous perennial with fragrant foliage. First introduced late sixteenth century.

CULTURE: Soil, ordinary, dryish. Position, sunny or partially shady borders. Plant, Oct., Nov., March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil outdoors in Aug. or Sept.; cuttings of fleshy roots inserted 2 in. deep in frame in March or April; divisions of roots in Oct., Nov. or March.

SPECIES CULTIVATED: *D. albus* (syn. *D. Fraxinella*), 'Burning Bush', 'Dittany', 'Fraxinella', 'Gas Plant', white, May, 3 ft., Europe, and vars. *caucasicus*, giant form, *albus purpureus*, purplish, May, 3 ft., *purpureus*, dark flowers, and *rubra*, rosy-red.

Dictyosperma—*Palmae*. Stove feather-leaved palms. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, pots in shady moist plant stove. Pot, Feb. or March. Water freely at all times. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 65°.

PROPAGATION: By seeds sown 1 in. deep in pots of sandy peat in temp. 85° in Feb., March or April.

SPECIES CULTIVATED: *D. album*, 15 to 20 ft., Mauritius, and vars. *aureum*, *furfuraceum* and *rubrum*.

Didymocarpus—*Gesneriaceae*. Stove perennial herbs. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat and loam, one-fourth part cow dung and sand. Position, well-drained pots in moist plant stove. Pot, Feb., March or April. Water moderately Oct. to Feb., freely afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By cuttings of young side shoots inserted in sandy soil under bell-glass in temp. 80° to 85° in March or April.

SPECIES CULTIVATED: *D. Humboldtiana*, lilac, autumn, 3 to 4 in., Ceylon; *malayana*, yellow, summer, 4 to 6 in., Malaya.

Didymochlaena—*Polypodiaceae*. Greenhouse fern. First introduced mid-nineteenth century.

CULTURE: Compost, two parts loam, one part peat, pounded charcoal and sand. Pot, Feb. or March. Position, well-drained pots in shady part of greenhouse. Water moderately Oct. to Feb., freely afterwards. Temp., Sept. to March 45° to 50°, March to Sept. higher with sun heat, shade and ventilation.

PROPAGATION: By spores sown on surface of sandy peat under bell-glass in temp. 70° to 80° at any time.

SPECIES CULTIVATED: *D. truncatula* (syn. *D. lunulata*), tree-like habit, Tropics.

Dieffenbachia (Dumb Cane)—*Araceae*. Stove evergreen perennials with oblong variegated leaves. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat and loam, one-fourth part decayed manure and silver sand. Position, well-drained pots in moist plant stove. Pot, Feb. or March. Water moderately Sept. to Feb., freely afterwards. Syringe daily June, July and Aug. Shade in summer essential. Temp., Sept. to Feb. 55° to 65°, Feb. to Sept. 65° to 85°.

PROPAGATION: By cuttings of stems 1 to 2 in. long inserted in sandy soil under bell-glass in temp. 75° to 85° in spring.

SPECIES CULTIVATED: *D. Bausei*, leaves yellowish-green, blotched dark green and spotted white, hybrid; *Boumannii*, leaves blotched dark and light green, Japan; *Carderi*, leaves variegated, Colombia; *Chelsonii*, leaves green and yellow, Colombia; *picta*, leaves dull green and white or yellow, S. America, vars. *Jenmannii*, leaves veined and spotted with white, *magnifica*, leaves spotted along veins; *picta*, leaves green, white and yellow, 4 ft., S. America; *Regina*, leaves white and green, S. America; *Seguine*, leaves green and white, Brazil, and vars. *irrorata*, *liturata* and *nobilis*.

Dielytra, see *Dicentra*.

Dierama (Wandflower)—*Iridaceae*. Hardy bulbous-rooted plant with sword-shaped leaves and long graceful flower stems.

CULTURE: Soil, light or sandy. Position, well-drained border at base of a south wall. Plant bulbs 3 in. deep and 3 in. apart in Nov. Lift and replant every third year.

PROPAGATION: By offsets from old bulbs.

SPECIES CULTIVATED: *D. pendulum*, lilac, Sept., 4 ft., S. Africa; *pulcherrimum* (syn. *Sparaxis pulcherrima*), blood-red, Sept., 3 to 4 ft., var. *album*, white flowers.

Diervilla (Bush Honeysuckle)—*Caprifoliaceae*. Deciduous low-growing stoloniferous shrubs suitable for holding banks, colonising or as tall ground cover. For other species sometimes listed under this name, see *Weigela*. First introduced early eighteenth century.

CULTURE: Soil, ordinary, moist. Position, sun or partial shade. In native surroundings grows on banks, rocks and hillsides.

PROPAGATION: By removal of suckers.

SPECIES CULTIVATED: *D. Lonicera*, yellow, to 4 ft., N. America; *rivularis*, lemon-yellow, to 6 ft., N. America; *sessilifolia*, sulphur-yellow, July to Aug., 2 to 3 ft., N. America; *splendens*, similar to *D. sessilifolia*, hybrid.

Digitalis (Foxglove)—*Scrophulariaceae*. Hardy biennial and perennial herbs.

CULTURE OF PERENNIAL SPECIES: Soil, rich, ordinary. Position, open shady border, or naturalised in woodlands and wild gardens. Plant, Oct. or April.

CULTURE OF BIENNIAL SPECIES: Sow seeds $\frac{1}{16}$ in. deep in shady border outdoors in April. Transplant seedlings 3 in. apart in shady bed in June. Transfer seedlings to flowering position in Oct. or Nov.

PROPAGATION: Perennials by seeds sown as directed for biennials; division of plants in March.

PERENNIAL SPECIES CULTIVATED: *D. dubia*, rose, June, 1½ ft., Balearic Isles; *grandiflora* (syns. *D. ambigua*, *D. ochroleuca*), yellow, July and Aug., 3 ft., Europe; *Thapsii*, rosy-purple, June to Aug., 2 to 4 ft., W. Europe.

BIENNIAL SPECIES CULTIVATED: *D. lanata*, grey and white or purple, summer, 2 to 3 ft., S.E. Europe; *purpurea*, 'Common Foxglove', purple, July to Sept., 3 to 5 ft., Europe (Br.); *purpurea gloxiniaeflora*, has longer racemes and more open flowers. There are numerous varieties and hybrid strains to be found in trade lists.

Dill, see *Anethum graveolens*.

Dillwynia—*Leguminosae*. Greenhouse, evergreen, flowering, heath-like shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts fibrous peat and loam, one-fourth part sand.

Position, pots in sunny greenhouse. Pot, March or June; firm potting essential. Prune straggling shoots a little after flowering. Water freely March to Sept., moderately afterwards. Temp., March to Sept. 60° to 65°, Sept. to March 45° to 50°. Place plants outdoors July to Sept. to mature growth.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light sandy compost in temp. 65° to 70° in March; cuttings inserted in pots of sandy peat under bell-glass in temp. 65° in summer.

SPECIES CULTIVATED: *D. ericifolia*, yellow and red, spring, 2 ft., Australia; *floribunda*, yellow and red, spring, 18 in., Australia; *hispida*, orange and red, spring, 1 ft., Australia.

Dimorphotheca (Cape Marigold)—*Compositae*. Half-hardy annuals and perennials from S. Africa. Usually grown as annuals. First introduced mid-eighteenth century.

INDOOR CULTURE: Compost, three parts sandy loam, one part leaf-mould and a liberal addition of silver sand. Pot, March or April. Grow in cool sunny greenhouse. Water freely during spring and summer, moderately in autumn and winter. Temp., Oct. to March 40° to 50°.

OUTDOOR CULTURE: Soil, ordinary, sandy. Position, sunny, warm border. Plant, May and June.

PROPAGATION: By seeds sown in a temp. of 55° in sandy soil in early spring.

SPECIES CULTIVATED: These are now placed in four genera as follows:

CASTALIS: *C. nudicaulis* (syn. *Dimorphotheca nudicaulis*), white with purple exterior, summer, 6 to 12 in., S. Africa; *spectabilis*, mauve, 6 to 12 in., Transvaal; *Tragus* (syn. *Dimorphotheca flaccida*, *D. aurantiaca* D.C. non hort.), orange yellow, 6 to 12 in., S. Africa.

CHRYSANTHEMOIDES: *C. monilifera* (syn. *Osteospermum moniliferum*), yellow, 3 to 6 ft., S. Africa, but introduced into New Zealand and Tasmania, a shrub with small edible fruits.

DIMORPHOTHECA: *D. chrysanthemifolia* (syn. *Calendula chrysanthemifolia*), yellow, summer, 2 to 3 ft., S. Africa; *D. cuneata* (syn. *Calendula viscosa*), white with bluish or copper exterior, summer, 2 to 3 ft., S. Africa; *pluvialis* (syn. *D. annua*), white and violet, summer, 1 ft., S. Africa, the opening and closing of the flowers (really dependent on temperature) was once thought to indicate rain; *sinuata* (syn. *D. aurantiaca* hort. non D.C., *D. pseudaurantiaca*), orange, summer, 1 ft., S. Africa, the most popular species; *turicensis* (syn. *D. aurantiaca hybrida*, *D. calendulacea dubia*), light yellow, violet-tinged, 1 ft., summer, hybrid.

OSTEOSPERMUM: *O. amplexans* (syn. *Tripteris amplexans*), yellow, summer, 1 to 3 ft., S. Africa; *Barberiae* (syn. *Dimorphotheca Barberiae*, *D. lilacina*), purple, summer, 1 to 2 ft., S. Africa; *Ecklonis* (syn. *Dimorphotheca Ecklonis*), white, with violet-blue exterior, purple disk, summer, 1 to 3 ft., S. Africa; *hyoseroides* (syn. *Tripteris hyoseroides*), orange with dark purple disk, summer, 2 ft., S. Africa; *Vaillantii* (syn. *Tripteris Vaillantii*), yellow, summer, 1 to 2 ft., S. Africa.

Dionaea—*Droseraceae*. Greenhouse, herbaceous, insectivorous, perennial plants. Are fringed with sensitive hairs closing together when touched.

CULTURE: Compost, equal parts peat and living sphagnum. Position, pots or pans well drained and partly immersed in pans of water, and placed under glass in cool greenhouse. Pot, March or April. Water freely always. Temp., Oct. to March 40° to 45°, March to Sept. 45° to 55°.

PROPAGATION: By seeds sown in mixture of sphagnum moss and peat, kept moist under bell-glass in March or April; division of plants in March.

SPECIES CULTIVATED: *D. muscipula*, 'Venus's Fly-Trap', white, July and Aug., 6 in., Carolina.

Dionysia—*Primulaceae*. Evergreen alpine cushion plants. Similar to *Androsace*.

CULTURE: Soil composed of loam, leaf-mould, grit and sharp sand in equal proportions. Best grown in the alpine house or cold frame. Keep very dry in winter.

PROPAGATION: By seeds sown in compost as above; cuttings of tiny shoots carefully taken in spring.

SPECIES CULTIVATED: *D. bryoides*, pink, sessile, spring, Persia; *curviflora*, red, sessile, spring, Persia; *ianthina*, yellow, sessile, spring, Persia; *oreodoxa*, yellow, sessile, spring, Persia.

Dioscorea (Yam)—Dioscoreaceae. Hardy tuberous-rooted climbing perennials. Tubers, large, milky, edible, cooked like potatoes.

CULTURE: Soil, ordinary. Position, sunny, open. Plant small tubers 3 in. deep and 12 in. apart in March. Fix stakes or branches for shoots to climb on. Lift and store tubers in frost-proof place in Oct.

PROPAGATION: By cuttings of stems 1 in. long with leaf attached, inserted $\frac{1}{4}$ in. deep in sandy soil under bell-glass in temp. 55° in summer.

SPECIES CULTIVATED: *D. Batatas*, 'Chinese Yam', white, summer, 12 ft., Philippines; *sativa*, 'Cultivated Yam', Tropics.

Diosma—Rutaceae. Greenhouse evergreen flowering shrub with fragrant leaves.

CULTURE: Compost, two parts fibrous peat, one part loam and silver sand. Pot, May, June. Pinch off points of vigorous shoots in July and Aug. Water very little Oct. to March, moderately afterwards. Temp., Sept. to March 40° to 45°, March to Sept. 50° to 55°.

PROPAGATION: By cuttings inserted in sandy peat under bell-glass in temp. 55° to 65° in March, April or May.

SPECIES CULTIVATED: *D. ericoides*, white, spring, 2 to 3 ft., S. Africa. For *D. uniflora* see *Adenandra*.

Diospyros—Ebenaceae. Deciduous or evergreen trees and shrubs with juicy edible fruits. Date plum introduced late sixteenth century, persimmons early twentieth century.

CULTURE: Soil, ordinary. Position, shrubberies for *D. armata*, *D. Lotus* and *D. virginiana*; south wall for *D. Kaki*, except in extreme S. of England. Plant, Oct. to Feb. Prune similarly to apple trees.

PROPAGATION: By seeds sown 1 in. deep outdoors in Sept. or Oct.

SPECIES CULTIVATED: *D. armata*, yellow fruits, 20 ft., half-evergreen, Cent. China; *Kaki*, 'Chinese Persimmon', yellowish-white, spring, yellow fruits, to 40 ft., China; *Lotus*, 'Date Plum', reddish white, July, purple or yellow fruits, to 45 ft., W. Asia, China and Japan; *virginiana*, 'Persimmon', yellow, July, pale yellow and red fruits, to 50 ft. or more, N. America.

Dipelta—Caprifoliaceae. Hardy deciduous shrubs with flowers resembling those of *Diervilla*. First introduced early twentieth century.

CULTURE: Soil, moist loam. Position, sunny sheltered shrubberies. Plant, autumn. Prune away dead wood only.

PROPAGATION: By cuttings inserted in cold frame in autumn.

SPECIES CULTIVATED: *D. floribunda*, pink and yellow, fragrant, May and June, 10 to 15 ft., W. China; *ventricosa*, deep rose and orange, May, 6 to 15 ft., W. China; *yunnanensis*, cream with orange markings, 10 ft., China.

Diphylleia—Berberidaceae. Hardy herbaceous perennial. First introduced early nineteenth century.

CULTURE: Soil, peaty. Position, moist shady borders. Plant, Oct. to March.

PROPAGATION: By division of plants in March or April.

SPECIES CULTIVATED: *D. cymosa*, 'Umbrella Leaf', white, May, 1 ft., N. America.

Diplacus, see Mimulus.

Dipladenia—Apocynaceae. Stove flowering evergreen climbers. First introduced mid-nineteenth century.

CULTURE: Compost, rough fibrous peat and one-fourth silver sand. Position, well-drained pots, with shoots trained to roof of stove or to wire trellis. Pot, Feb. or March. Prune, Oct., cutting away shoots that have flowered only. Water

very little Oct. to Feb., moderately Feb. to April, freely afterwards. Temp., Oct. to Feb. 55° to 60°, Feb. to Oct. 65° to 75°.

PROPAGATION: By cuttings of young side shoots 3 in. long inserted in pots of sandy peat under bell-glass in temp. 80° in Feb., March or April.

SPECIES CULTIVATED: *D. atropurpurea*, purple, summer, 10 ft., Brazil; *boliviensis*, white and yellow, summer, 8 to 10 ft., Bolivia; *Sanderi* (syn. *Mandevilla Sanderi*), rose, summer, 10 ft., Brazil; *splendens*, white, rose and purple, summer, 8 to 12 ft., Brazil, and vars. *amabilis*, rosy crimson, *Brearleyana*, crimson, *hybrida*, crimson-red, and *profusa*, carmine. See also *Odontodenia*.

Diplarrhena—*Iridaceae*. Rather tender perennial plants.

CULTURE: Deep sandy loam and full sun in the border.

PROPAGATION: By seeds; division of old plants.

SPECIES CULTIVATED: *D. Moraea*, white, purple and gold, 2 ft., summer, Australia.

Disa—*Orchidaceae*. A genus of terrestrial, tuberous-rooted orchids, chiefly African. The upper sepal is often the largest segment, often hood-like and developed into a short spur at its base. The S. African species are the most commonly cultivated. The leaves are often in rosette formation.

CULTURE: Compost, three parts of finely shredded osmunda fibre or peat, two parts sphagnum moss and a few half-decayed leaves with potsherds pounded to dust, or sand. A very little loam fibre may be added. A cool moist atmosphere is necessary and the compost must never approach dryness. They may grow in a cold frame in summer with shading but require a winter temp. of 45° to 50°. The *Odontoglossum* house often suits. Air must be given but draughts avoided. Spikes leafy from centre of growth. Species from warmer parts of Africa need much more warmth and a winter rest.

PROPAGATION: The stronger crowns form offsets which may be carefully removed in early spring and potted. Success is occasionally obtained from seeds sown on compost.

SPECIES CULTIVATED: *D. racemosa*, rose-purple or whitish to rose, summer, S. Africa; *tripetaloides*, whitish, suffused and dotted rose-pink, summer, S. Africa; *uniflora* (syn. *D. grandiflora*), flowers 3 to 7, large, crimson, shaded yellow, spring, summer, S. Africa. From these three species a number of beautiful hybrids have been derived.

Dishcloth Gourd, see *Luffa*.

Disporum—*Liliaceae*. Hardy herbaceous perennials.

CULTURE: Soil, cool, preferably lime-free. Position, half-shade or cool spot.

PROPAGATION: By seed; division of roots in spring.

SPECIES CULTIVATED: *D. Hookeri*, greenish-yellow, early summer, 4 to 6 in., California; *lanuginosum*, pale yellow, summer, 6 in., N. America.

Ditch Moss, see *Anacharis canadensis*.

Dittany, see *Dictamnus albus*.

Diuris—*Orchidaceae*. A terrestrial tuberous genus of Australasia, 30 or more species. The flowering stem rises from the centre of the leaves. The lateral sepals are often longer than the other segments.

CULTURE: Compost, three parts sandy loam to one part of decayed leaves. Water may be required occasionally in the winter. Temp. then 50° to 55°. Considerably higher in summer by sun-heat, with shading.

PROPAGATION: Uncertain, as with nearly all tuberous orchids, offsets may occur.

SPECIES CULTIVATED: *D. alba*, 1 to 8, white, or marked with lilac to purple, autumn, Queensland; *longifolia*, yellow or purplish, spring, Australia; *maculata*, 2 to 10, yellow, spotted or flushed purplish-brown, spring, Queensland.

Divi-Divi, see *Caesalpinia coriaria*.

Dizygotheca (False Aralia)—*Araliaceae*. Tender greenhouse shrubs. Formerly included in *Aralia*. First introduced mid-seventeenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould, charcoal and sand. Pot, Feb. to March. Water freely March to Oct., moderately afterwards. Temp., March to Sept. 70° to 80°, Sept. to March 60° to 70°.

PROPAGATION: By grafting; cuttings in heat; portions of roots in April.

SPECIES CULTIVATED: *D. elegantissima*, thread-like drooping leaflets, Pacific Isles; *Kerchoviana*, prominently notched leaflets, Pacific Isles; *Veitchii*, leaves toothed or wavy-margined, reddish beneath, Pacific Isles.

Dock, see *Rumex*.

Dodecatheon (American Cowslip)—*Primulaceae*. Hardy herbaceous perennials. First introduced early eighteenth century.

OUTDOOR CULTURE: Soil, light loam enriched with plenty of leaf-mould. Position, sheltered beds on rockeries, or in borders under shade of trees. Plant, Jan. or Feb. Top-dress in Feb. with well-decayed manure.

POT CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, 6 in. pots, well drained, in cold frame Nov. to March, then in unheated greenhouse till after flowering, when place outdoors. Pot, Nov. Water moderately when new growth appears, freely when in full growth.

PROPAGATION: By seeds sown in pots of light sandy soil in cold frame in Sept. or March; division of crowns in Oct. or March.

SPECIES CULTIVATED: *D. Clevelandii*, violet blue, May, 1 ft., California; *Hendersonii*, crimson and yellow, March, 6 in., Oregon; *Jeffreyi*, purple-rose, spring, 6 in., California; *Meadia*, rosy purple, white and lilac, April, 1 ft., N. America, var. *album*, white, *lilacinum*, lilac, *radicatum*, rose, 6 in., April, Kansas to N. Mexico.

Dog Rose, see *Rosa canina*; **-Violet**, see *Viola canina*; **-wood**, see *Cornus*.

Dog's-Tooth Violet, see *Erythronium Dens-canis*.

Dolichos—*Leguminosae*. Greenhouse evergreen twiner. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam and peat, little sand. Position, well-drained pots, shoots twining round trellis, posts or pillars. Pot, Feb. Water moderately in winter, freely in summer. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown in light soil in temp. 65° in March; cuttings inserted in sandy soil under bell-glass in temp. 65° in April.

SPECIES CULTIVATED: *D. Lablab*, 'Bonavist' 'Hyacinth Bean', rosy purple, July, 1 to 2 ft., Tropics.

Dombeya—*Sterculiaceae*. Stove ornamental evergreen trees. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy loam and fibrous peat. Position, large pots or borders in warm greenhouse. Temp., March to Oct. 75° to 90°, Oct. to March 65° to 75°. Water freely during growing season.

PROPAGATION: By cuttings of nearly ripe wood in sandy soil under hand-light in April. Temp. 80°.

SPECIES CULTIVATED: *D. Burgessiae*, white and rose, 10 ft., S. Africa; *Cayeuxii*, bright pink, 10 ft., Madeira; *Mastersii*, white, fragrant, Trop. Africa; *natalensis*, white, fragrant, Natal; *spectabilis*, white, 20 to 30 ft., East Trop. Africa; *Wallichii*, scarlet, 20 to 30 ft., Madagascar.

Doodia—*Polypodiaceae*. Greenhouse evergreen ferns. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould, charcoal and sand. Pot, Feb., March or April. Position, pots in shady part of greenhouse. Water moderately Sept. to March, freely afterwards. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By spores sown on surface of sandy peat in pans under bell-glass in temp. 65° to 75° at any time.

SPECIES CULTIVATED: *D. aspera*, 6 to 8 in., Australia; *caudata*, 6 to 12 in., Australia; *lunulata* (syn. *D. media*), 12 to 18 in., Australia; *maxima* (syn. *D. Blechnoides*), 12 to 18 in., N.S.W.

Doritis—*Orchidaceae*. An epiphytic genus; though allied to *Phalaenopsis* there are discrepancies with that genus.

CULTURE: Compost and conditions as for *Phalaenopsis*, but the species, though variable, is of harder nature and so more exposure to light and fewer waterings in winter are required.

PROPAGATION: Side shoots seldom or never develop, though the stems are taller than those of *Phalaenopsis*.

SPECIES CULTIVATED: *D. pulcherrima* (syn. *Phalaenopsis Esmeralda*), flowers many, 1 in. or more across, lilac or light or dark amethyst, lip purple or amethyst, very variable, late summer, leaves 5 to 8 in. long, rounded, scapes erect, slender up to 30 in. high, simple or branched, Cochin-China, Moulmein, Siam.

Doronicum (Leopards-bane)—*Compositae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary, rich. Position, open borders, banks, or under shade of trees. Plant, Oct., Nov., March or April. This genus also does well in pots for early flowering in cold greenhouse.

PROPAGATION: By division of roots in Oct. or March.

SPECIES CULTIVATED: *D. austriacum*, yellow, March, 18 in., Europe; *caucasicum*, yellow, April, 1 ft., Europe; *cordatum*, deep yellow, April to May, 9 in., Europe and Asia Minor; *Pardalianches*, yellow, May, 2 ft., Europe (Br.); *plantagineum*, yellow, March, 3 ft., Europe (Br.), var. *giganteum*, more robust with larger flower heads.

Doryanthes—*Amaryllidaceae*. Greenhouse flowering plants. First introduced early nineteenth century.

CULTURE: Equal parts loam and leaf-mould, little sand. Position, well-drained pots in light airy greenhouse. Pot, Feb., March or April. Water very little Sept. to April, moderately afterwards. Temp., Sept. to March 50° to 55°, March to Sept. 65° to 70°.

PROPAGATION: By suckers removed from old plants and placed in small pots in temp. 55° to 65° at any time.

SPECIES CULTIVATED: *D. excelsa*, 'Australian Giant Lily', scarlet, summer, 8 to 12 ft., N.S. Wales; *Guilfoylei*, crimson, summer, 12 to 15 ft., Queensland; *Palmeri*, 'Spear Lily', red, summer, 12 ft., Queensland.

Dorycnium—*Leguminosae*. Hardy and half-hardy shrubby plants.

CULTURE: Good loam and sunny position.

PROPAGATION: By seeds; cuttings of well-ripened shoots after flowering.

SPECIES CULTIVATED: *D. hirsutum*, pink, 18 in., summer, S. Europe.

Double Bladder Pod, see *Physaria didymocarpa*.

Douglasia—*Primulaceae*. Hardy tufted evergreen plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat and loam. Position, sunny rockery. Plant, Oct., Nov., March or April.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in sandy peat in cold frame, or under hand-light in March or April; division of plants in autumn.

SPECIES CULTIVATED: *D. laevigata*, rosy pink, March to Sept., 1 in., Oregon Mountains; *montana*, pink, 2 in., spring, U.S.A., var. *praetutiana*, yellow, spring; *nivalis*, pink, April, 1 in., Rocky Mountains; *Vitaliana* (syn. *Androsace Vitaliana*), yellow, May to July, 2 in., Alps.

Dovedale Moss, see *Saxifraga hypnoides*.

Dove Flower, see *Peristeria elata*.

Downingia—*Lobeliaceae*. Hardy annuals. First introduced early nineteenth century.

CULTURE: Soil, ordinary, rich. Position, sunny beds or borders. Sow seeds in April where plants are to flower. Thin seedlings to 6 in. apart in May or June.

POT CULTURE: Compost, equal parts loam, leaf-mould and sand. Sow seeds $\frac{1}{8}$ in. deep in 5 or 6 in. pots placed in temp. 55°, or in cold frame in April or May. Water moderately. Apply weak liquid manure until plants are in flower. Place plants when in flower in cool greenhouse or window.

SPECIES CULTIVATED: *D. elegans* (syn. *Clintonia elegans*), blue and white, summer, 6 in., N.W. America; *pulchella* (syn. *Clintonia pulchella*), blue, white and yellow, summer, 6 in., W. America.

Down Thistle, see *Onopordum Acanthium*.

Draba (Whitlow Grass)—*Cruciferae*. Hardy perennial plants.

CULTURE: Soil, ordinary. Position, crevices in sunny rockeries, or on old walls. Plant, March or April.

PROPAGATION: By seeds sown where plants are to grow or in pans of sandy soil in April; division of roots in March.

SPECIES CULTIVATED: *D. aizoides*, yellow, March, 3 in., Europe (Br); *Aizoon*, yellow, April, 3 in. W. Europe; *alpina*, yellow, April, 3 in., N. Europe and Asia; *brunifolia*, yellow, June, 3 in., Caucasus; *bryoides*, yellow, 2 in., April to May, Caucasus, var. *imbricata*; *Dedeana*, white, May, 2 to 3 in., Spain; *Mawii*, white, early spring, 3 in., Spain; *mollissima*, soft yellow, 2 in., early spring, Caucasus; *olympica*, golden, 3 in., spring, Asia Minor; *polytricha*, yellow, 2 in., spring, Turkish Armenia; *rigida* (syn. *D. diacranoides*), yellow, 3 in., spring, Asia Minor; *stylaris*, yellow, 3 to 4 in., April to May, Europe; *vesicaria*, yellow, 2 in., May, Lebanon.

Dracaena—*Liliaceae*. Stove evergreen plants grown in greenhouse for the handsome, often variegated, foliage. Some species were formerly known as *Pleomele*. First introduced early seventeenth century.

CULTURE: Compost, two parts loam, one part peat and one part leaf-mould and sand. Position, well-drained pots in light part of stove. Pot, Feb. to March. Water moderately Oct. to March, freely afterwards. Temp., March to Sept. 75° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By seeds in sandy soil in temp. 85° in March; cuttings of main stem cut into lengths of 1 to 2 in. and partially buried horizontally in sandy peat in March or April; cuttings or 'toes' of fleshy roots in sandy peat in spring; tops of stems in sand in March or April.

SPECIES CULTIVATED: *D. concinna*, leaves green, margined with red, 4 to 6 ft., Madagascar; *deremensis*, leaves long and pointed, 10 to 15 ft., Trop. Africa; *Draco*, 'Dragon Tree', leaves glaucous, hardy in Cornwall and Scilly Isles, 40 to 50 ft., Canary Islands; *fragrans*, leaves green, 15 to 20 ft., Trop. Africa, and vars. *Lindenii*, *Massangeana*, *Victoriae*, garden form; *Godseffiana*, leaves white and green, 3 ft., W. Trop. Africa; *Goldieana*, leaves green and white, 4 to 6 ft., W. Trop. Africa; *Sanderiana*, leaves white and green, 5 ft., W. Trop. Africa.

Dracocephalum (Dragonhead)—*Labiatae*. Hardy annual and perennial herbs. First introduced late sixteenth century.

CULTURE: Soil, light, ordinary. Position, cool, partially shady borders. Plant, Oct., Nov., March or April.

PROPAGATION: Annual and perennial species by seeds sown $\frac{1}{8}$ in. deep in light sandy soil outdoors in April; cuttings of young shoots inserted in light sandy soil under hand-light or in cold frame in April or May; division of roots in Oct., Nov. or March.

ANNUAL SPECIES CULTIVATED: *D. Moldavica*, 'Moldavian Balm', blue, July and Aug., 12 to 18 in., E. Siberia; *Isabellae*, 2 ft., purple-blue, China; *Purdomii*, purple-blue, May, 9 in., Asia.

PERENNIAL SPECIES CULTIVATED: *D. austriacum*, blue, summer, 12 to 18 in., Europe; *bullatum*, 9 in., bright blue, July, China; *grandiflorum*, blue, summer, 6 to 9 in., Siberia; *Hemsleyanum*, light blue, summer, 1½ to 2 ft., Tibet; *palustre*, rose, 12 to 15 in., for waterside; *Ruyschiana*, purplish-blue, June, 12 to 18 in., Alps; *sibiricum* (syns. *Nepeta macrantha*, *N.* 'Souvenir d'André Chaudron'), blue, July, 4½ ft., Siberia; *speciosum*, lilac, June, 18 in., Himalaya; *Stewartianum* violet, summer, 1½ ft., China. See also *Physostegia*.

Dracunculus (Dragon Arum)—*Araceae*. Hardy tuberous-rooted perennial. Unisexual flowers on spadices surrounded by spathes, very offensive odour when in bloom. First introduced early sixteenth century.

CULTURE: Soil, sandy. Position, well-drained sunny border. Plant tubers 3 in. deep in Oct. or Nov.

PROPAGATION: By division of tubers in Oct. or March.

SPECIES CULTIVATED: *D. vulgaris* (syn. *Arum Dracunculus*), chocolate-brown, July, 3 ft., S. Europe.

Dragon Arum, see, *Dracunculus*; -**Tree**, see *Dracaena Draco*.

Dragonhead, see *Dracocephalum*; **False-**, see *Physostegia*.

Drimys—*Magnoliaceae*. Tender ornamental deciduous tree. First introduced early nineteenth century.

CULTURE: Soil, good loamy. Position, warm, sheltered borders in favoured localities only. Plant, Oct.

PROPAGATION: By cuttings of ripened wood inserted in a cold frame in autumn, or by layering in spring.

SPECIES CULTIVATED: *D. Winteri*, ivory white, aromatic, April to May, 12 to 40 ft., S. America.

Drooping Urn Flower, see *Urceolina pendula*.

Dropwort, see *Filipendula vulgaris*.

Drosera—*Droseraceae*. Greenhouse and hardy perennial insectivorous plants.

CULTURE: Compost, equal parts living sphagnum moss, peat, charcoal, sand and potsherds. Position, well-drained pots in moist position in sunny greenhouse. Water freely except in winter.

PROPAGATION: By seeds sown on surface of living sphagnum moss and peat in well-drained pots under bell-glass in temp. 55° to 65° at any time; division of the crowns in March or April; cuttings of roots ½ to 1 in. long embedded in pan of moss and peat under bell-glass in temp. 65° to 75°.

SPECIES CULTIVATED: *D. binata*, white, June to Sept., 3 to 4 in., Australia; *capensis*, purple, June to July, 3 to 4 in., Cape of Good Hope; *longifolia*, white, July, 3 in., Europe (Br.); *rotundifolia*, 'Sundew', white, July, 4 in., Europe (Br.).

Drosanthemum—*Aizoaceae*. Greenhouse succulent plants, formerly included in *Mesembryanthemum*.

CULTURE: As *Mesembryanthemum*.

PROPAGATION: As *Mesembryanthemum*.

SPECIES CULTIVATED: *D. floribundum* (syn. *Mesembryanthemum floribundum*), pink July, 6 in., S. Africa.

Drosophyllum—*Droseraceae*. Greenhouse sub-shrubby insectivorous plants. First introduced mid-nineteenth century.

CULTURE: Soil, light sandy loam and fibrous peat. Position, well-drained pots close to glass in light airy greenhouse. Water moderately summer, little winter. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By seeds sown on the surface of sandy loam in well-drained pots in spring.

SPECIES CULTIVATED: *D. lusitanicum*, 'Portuguese Sundew', yellow, May, 1 ft., Portugal.

Dryas—*Rosaceae*. Hardy evergreen creeping or trailing plants.

CULTURE: Soil, moist peat. Position, sunny rockery or borders. Plant, Oct., Nov. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy peat in shallow pans or boxes in cold frame April or May; cuttings of shoots 2 in. long inserted in sandy soil in cold frame in autumn; division of plants in Oct., Nov. or March.

SPECIES CULTIVATED: *D. Drummondii*, yellow, June, 3 in., N. America; *octopetala*, 'Mountain Avens', white, June, 3 in., trailing, Europe, vars. *minor*, Europe (Br.), *vestita*, white, leaves felted grey, Alps; *Suendermannii*, white, June, 3 to 4 in., hybrid.

Dryopteris—*Polypodiaceae*. Stove, greenhouse and hardy ferns. Many ferns previously known as *Aspidium*, *Lastrea*, *Nephrodium* and *Thelypteris* are now included in this genus.

CULTURE OF STOVE SPECIES: Compost, equal parts loam, leaf-mould, peat and sand. Position, well-drained pots in shady part of stove. Pot, March. Water moderately Oct. to March, freely afterwards. Temp., Sept. to March 55° to 60°, March to Sept. 65° to 75°.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts loam, leaf-mould, peat and sand. Position, well-drained pots, borders or rockeries in shade. Pot or plant, Feb., March or April. Water moderately Oct. to Feb., freely afterwards. Temp., Oct. to March 40° to 50°, March to Oct. 55° to 65°.

CULTURE OF HARDY SPECIES: Soil, ordinary, light, rich. Position, shady borders or rockeries. Plant, April. Water freely in dry weather May to Sept. Top-dress annually with leaf-mould or well-decayed manure. Protect in severe weather with bracken or litter. Do not remove dead fronds until April.

PROPAGATION: Stove and greenhouse species by spores sown on surface of fine sandy peat under bell-glass in temp. 75° to 85° any time; division of plants at potting or planting time. Hardy species by spores sown on surface of sandy soil in shady cold frame; division in April.

STOVE SPECIES CULTIVATED: *D. dissecta* (syn. *Nephrodium dissectum*), Tropics; *orientalis* (syn. *Nephrodium albo-punctatum*), Mascarene Is.

GREENHOUSE SPECIES CULTIVATED: *D. concolor*, India, Brazil; *decomposita* (syn. *N. decompositum*), Australia, etc.; *effusum*, Jamaica; *erythrosora*, Japan; *hasiana* (syn. *N. cuspidatum*), Ceylon; *lepida*, Polynesia; *otaria*, Japan; *parasitica* (syn. *N. molle*), Tropics and Subtropics; *patens*, Tropics and Subtropics; *pubescens*, Jamaica; *refracta*, Brazil; *Richardsii*, New Caledonia; *Sieboldii*, Japan.

HARDY SPECIES CULTIVATED: *D. aemula*, 'Hay-scented Fern', Britain; *cristata*, Britain and N. America; *Filix-mas*, 'Male Fern', Britain and Temp. Zone, and numerous vars.; *fragrans*, N. America; *Goldiana* (syn. *Aspidium Goldianum*), N. America; *Linnaeana* (syn. *Polypodium Dryopteris*), Europe, Britain etc.; *marginalis*, (syn. *Aspidium marginale*), Canada; *Phegopteris*, 'Beech Fern', Britain; *rigida*, Europe; *spinulosa*, N. Temp. Zone (Br.); *Thelypteris* (syns. *Aspidium Thelypteris*, *Thelypteris palustris*), N. America, Europe, Asia.

Drypis—*Caryophyllaceae*. Hardy herbaceous perennial. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, sunny rockeries or borders. Plant, Oct., Nov., March, April.

PROPAGATION: By seeds sown in light soil in cold frame or under hand-light in March or April; cuttings inserted in sandy soil under hand-light or in cold frame in Sept. or Oct.

SPECIES CULTIVATED: *D. spinosa*, blue, summer, 9 in., Medit. Region.

Duck Potato, see *Sagittaria latifolia*.

Ducksfoot, see *Podophyllum peltatum*.

Duke of Argyll's Tea-plant, see *Lycium chinense*.

Dusty Miller, see *Primula auricula* and *Senecio Cineraria*.

Dutch Agrimony, see *Eupatorium cannabinum*; **-Myrtle**, see *Myrica Gale*; **-Woodbine**, see *Lonicera Periclymenum* var. *belgica*.

Dutchman's Breeches, see *Dicentra Cucullaria*; **-Pipe**, see *Aristolochia durior*.

Dwarf Sunflower, see *Actinea grandiflora*.

Dyckia—*Bromeliaceae*. Greenhouse, succulent, ornamental, foliage plants. First introduced mid-nineteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and little sand. Position, pots in light airy greenhouse; outside June to Sept. Water moderately April to Aug., little afterwards. Repot every five or six years; good drainage essential. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By offsets or suckers inserted in small pots in greenhouse at any time.

SPECIES CULTIVATED: *D. altissima*, yellow, autumn, 2 ft., Brazil; *brevifolia*, yellow, Aug., 1 ft., Brazil; *frigida*, orange-yellow, spring, 1 to 2 ft., Brazil; *rariflora*, orange, summer, 2 ft., Brazil.

Dyer's Greenweed, see *Genista tinctoria*.

Earthnut, see *Arachis hypogaea*.

Ebenus—*Leguminosae*. Slightly tender evergreen sub-shrubs.

CULTURE: Soil, poorish, well drained. Position, warm, sheltered ledges in the rock garden.

PROPAGATION: Seeds; cuttings.

SPECIES CULTIVATED: *E. cretica*, pink, 2 ft., summer, Crete; *Sibthorpii*, pink, 1 to 2 ft., summer, Greece.

Eccremocarpus—*Bignoniaceae*. Half-hardy climbing plant. Stems herbaceous in the open. First introduced early nineteenth century.

CULTURE: Soil, light, rich. Position, against south or south-west walls. Plant, June. Protect roots in Oct. by layer of cinder ashes on surface of soil; base of plant in severe weather by mats.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in well-drained pots of light sandy soil in temp. 55° to 65° in March or April.

SPECIES CULTIVATED: *E. scaber*, 'Chilean Glory Flower', scarlet and yellow, summer, 15 to 20 ft., Chile.

Echeveria—*Crassulaceae*. Greenhouse and half-hardy succulent plants, by some authors included in the genus *Cotyledon*.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part sand and fine brick rubble. Position, in well-drained pots close to glass in window or greenhouse. Repot, March or April. Water freely March to Sept., very little afterwards. Temp., Sept. to March 50° to 55°, March to Sept. 60° to 70°. Can be grown outdoors June to Sept.

CULTURE OF HALF-HARDY SPECIES: Soil, ordinary. Position, sunny rockeries or as edgings to beds. Plant in May, place in boxes in cold frame in Oct.

PROPAGATION: By seeds in temp. 55° to 65° in March; cuttings of leaves with base inserted in well-drained pots of sandy soil in Aug. to Oct. in temp. 55° to 60°. Do not water leaves or cuttings until they begin to shrivel.

SPECIES CULTIVATED: *E. agavoides*, orange, Sept., 1 ft., Mexico; *caespitosa* (syn. *Cotyledon californica*), yellow, summer, 1 ft., California; *coccinea*, red, Oct., 2 ft., Mexico; *farinosa*, orange-red, summer, leaves silvery-white, California; *gibbiflora*, red, autumn, 2 ft., Mexico; *glauca*, red and yellow, autumn, 1 ft., Mexico; *retusa*, bright red, autumn, 1 ft., Mexico.

HALF-HARDY SPECIES CULTIVATED: *E. secunda*, reddish, summer, 1 ft., Mexico.

Echinacea (Purple Cone Flower)—*Compositae*. Hardy herbaceous perennials. First introduced late eighteenth century.

CULTURE: Soil, deep, rich, light loam. Position, well-drained sunny borders. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in boxes of light soil in temp. 50° to 55° in March, or outdoors in sunny position in April; division in Oct., March or April; root cuttings in Feb.

SPECIES CULTIVATED: *E. angustifolia*, purplish-red, summer, 1 to 2 ft., N. America; *purpurea* (syn. *Rudbeckia purpurea*), purplish-red, Aug., 3 ft., N. America.

Echinocactus—Cactaceae. Greenhouse succulent plants. Many species formerly included in this genus have been transferred to other genera including *Gymnocalycium*, *Notocactus*, *Pediocactus*, *Pyrrhocactus*, *Stenocactus*, etc. First introduced late eighteenth century.

CULTURE: Compost, two parts fibrous sandy loam, one part brick rubble, old mortar and sand. Position, well-drained pots in sunny greenhouse or window. Repot every three or four years in spring. Water occasionally Sept. to April, once a week afterwards. Temp., Sept. to March 50° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pans of sandy soil in temp. 75° in March, keeping soil moderately moist; cuttings of stems inserted in small pots of sandy soil kept barely moist, in summer; grafting on common kinds in April.

SPECIES CULTIVATED: *E. Grusonii*, red and yellow, summer; *Visnaga*, yellow, summer, 5 ft., Mexico.

Echinocereus—Cactaceae. Greenhouse plants with fleshy, spiny stems, without leaves. Formerly included in the genus *Cereus*. First introduced late seventeenth century.

CULTURE: Compost, two parts fibrous loam, one part coarse sand and broken brick. Position, well-drained pots in sunny greenhouses or windows. Pot every two or three years as required, water sparingly. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown in well-drained pots or pans; cuttings of stems inserted in pots of sand and kept just moist; grafting on other kinds in spring.

SPECIES CULTIVATED: *E. Blanckii*, purple, Texas, Mexico; *coccineus* (syn. *Cereus aggregatus*), scarlet, Sept., U.S.A.; *conglomeratus*, Mexico; *enneacanthus*, purple, Mexico, Texas; *Fendleri*, purple, Mexico; *pentalophus*, rose, Mexico, Texas; *Richenbachii* (syn. *Cereus caespitosus*), rose, summer, U.S.A.

Echinocystis—Cucurbitaceae. Half-hardy annual climber, bearing small prickly cucumber-like fruits.

CULTURE: Sow seeds in heat in spring, and plant out in moist rich soil in May against a sunny trellis, fence or arch.

SPECIES CULTIVATED: *E. lobata*, 'Wild Balsam Apple', greenish-white, summer, 8 to 10 ft., United States.

Echinodorus—Alismaceae. Waterside plants akin to *Alisma*.

CULTURE: Soil, any wet mud. Plant, in spring.

PROPAGATION: Seeds or division in spring.

SPECIES CULTIVATED: *E. ranunculoides*, rosy-white, tapering leaves, Europe (Br.), N. Africa.

Echinops (Globe Thistle)—Compositae. Hardy biennials and perennials. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, well-drained sunny borders. Plant, Oct., Nov. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sunny position outdoors in April; division of roots in Oct. or March; root cuttings.

PERENNIAL SPECIES CULTIVATED: *E. bannaticus*, violet blue, summer, 2 to 3 ft., Hungary; *Ritro*, blue, summer, 3 ft., S. Europe; *sphaerocephalus*, pale blue, summer, 3 to 4 ft., Europe.

Echinopsis—*Cactaceae*. Greenhouse succulent plants. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous sandy loam, one part brick rubble, old mortar and sand. Position, well-drained pots in sunny greenhouse or window. Repot every three or four years in spring. Water occasionally Sept. to April, once a week afterwards. Temp., Sept. to March 50° to 55°, March to Sept. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pans of sandy soil in temp. 75° in March, keeping soil moderately moist; cuttings of stems inserted in small pots of sandy soil, kept barely moist in summer; grafting on common kinds in April.

SPECIES CULTIVATED: *E. cristata*, creamy-white, summer, 1 ft., Bolivia; *Eyriesii*, white, fragrant, July, 4 to 6 in., Mexico; *leucantha* (syn. *E. campylacantha*), rose, summer, 1 ft., Chile; *multiplex*, rose, July, Brazil; *oxygona*, rose, summer, 6 ins., Brazil; *tubiflora*, white, summer, 4 in., Mexico.

Echites—*Apocynaceae*. Stove evergreen flowering and climbing shrub. First introduced mid-nineteenth century.

CULTURE: Compost, rough fibrous peat and one-fourth silver sand. Position, well-drained pots, with shoots trained to roof of stove or to wire trellis. Pot, Feb. or March. Prune, Oct., cutting away shoots that have flowered only. Water very little Oct. to Feb., moderately Feb. to April, freely afterwards. Temp., Oct. to Feb. 55° to 60°, Feb. to Oct. 65° to 75°.

PROPAGATION: By cuttings of young side shoots 3 in. long inserted in pots of sandy peat under bell-glass in temp. 80° in Feb., March or April.

SPECIES CULTIVATED: *E. rubro-venosa*, emerald green leaves, speckled red or yellow, Brazil.

Echium (Viper's Bugloss)—*Boraginaceae*. Hardy annuals, biennials and perennials.

CULTURE: Soil, ordinary. Position, sunny well-drained borders or wild garden. Plant, Aug. or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sunny position outdoors in April or Aug.

ANNUAL OR BIENNIAL SPECIES CULTIVATED: *E. creticum*, violet, July, 12 to 18 in., S. Europe; *plantagineum*, bluish-purple, summer, 2 to 3 ft., S. Europe (Br.); *vulgare*, purple or blue, summer, 3 to 4 ft., Britain; *Wilderetii*, rose, summer, 3 ft., Canary Isles.

PERENNIAL SPECIES CULTIVATED: *E. albicans*, rose or violet, summer, 1 ft., Spain.

Edelweiss, see *Leontopodium alpinum*.

Edgeworthia—*Thymelaeaceae*. Slightly tender, deciduous, early-flowering shrub bearing dense heads of fragrant little yellow flowers in Feb. or March. Allied to *Daphne*, and can be grown outdoors in milder counties and maritime districts. The bast is a source of soft tough paper.

CULTURE: Compost, two parts sandy loam and one part turfy peat. Good drainage and a liberal supply of water in summer are essential.

PROPAGATION: By cuttings in sandy soil under bell-glass in spring.

SPECIES CULTIVATED: *E. papyrifera* (syns. *E. chrysantha*, *E. Gardneri*), 'Paper Bush', 'Mitsumata', yellow, Feb. to March, 4 to 6 ft., China, Japan.

Edraianthus—*Campanulaceae*. Hardy low tufted perennial plants.

CULTURE: Soil, any open, gritty medium. Position, warm and sunny.

PROPAGATION: By seeds; cuttings made from soft tips.

SPECIES CULTIVATED: *E. dalmaticus*, purple-blue, cluster-headed, 6 in., summer, Dalmatia; *graminifolius*, blue, cluster-headed, 9 in., summer, Europe; *pumilio*, blue, 2 to 3 in., June, Dalmatia; *serpyllifolius*, deep purple-blue, prostrate, May to June, Dalmatia; *tenuifolius*, blue, fine-leaved, May, 3 to 4 in., Europe.

Eel Grass, see *Vallisneria*.

Egeria, see *Anacharis*.

Eggplant or Aubergine, see *Solanum Melongena* var. *esculentum*.

Eglantine, see *Rosa Eglanteria*.

Egyptian Lotus, see *Nymphaea Lotus*.

Eichhornia—*Pontederiaceae*. Tender floating aquatic perennials. First introduced mid-nineteenth century.

CULTURE: Float on water during summer months. In Sept. pot number closely together in bowls of sifted loam and charcoal and fill with water. Reduce water gradually till plants are in wet soil only during winter months. Store away from frost and restart in temp. 60° about March. Multiplies rapidly in temp. 60° to 70°.

PROPAGATION: By division in early summer, or by severing the stolons from natural runners.

SPECIES CULTIVATED: *E. azurea*, runs lengthwise, 5 to 6 ft., lavender-blue and yellow, S. America; *crassipes* (syn. *E. speciosa*), 'Water Hyacinth', rounded habit, swollen petioles make it buoyant, pale violet, peacock eye, Africa, Australia, Trop. America.

Elaeagnus—*Elaeagnaceae*. Hardy deciduous and evergreen shrubs with insignificant but mostly fragrant silver-coloured flowers resembling small fuchsias. First introduced mid-seventeenth century.

CULTURE: Soil, ordinary. Position, open sheltered dryish borders or against south or west walls. Plant deciduous species in Oct. to Dec., evergreen species in April or Sept.

PROPAGATION: By seeds in boxes of light soil in temp. 55° in March; cuttings in sandy soil in cold frame in Sept.; layering in spring.

EVERGREEN SPECIES CULTIVATED: *E. glabra*, white, Aug., 4 to 6 ft., China, Japan; *macrophylla*, yellow, Nov., very fragrant, 6 ft., Japan; *pungens*, yellow, autumn, 6 ft., China, Japan, vars. *aurea*, *maculata*, golden-leaved, *variegata*, leaves bordered yellow.

DECIDUOUS SPECIES CULTIVATED: *E. angustifolia*, 'Oleaster', silvery white and yellow, June, 15 to 20 ft., Europe, W. Asia; *commutata*, yellow, July, 8 ft., N. America; *multiflora*, creamy, April to May, 6 to 10 ft., Japan; *umbellata*, strong growing and spreading, May, fruits silver then red, 15 ft., Himalaya, Japan.

Elaphoglossum—*Polypodiaceae*. Stove and greenhouse evergreen ferns, formerly included in the genus *Acrostichum*.

CULTURE: As *Acrostichum*.

PROPAGATION: As *Acrostichum*.

STOVE SPECIES CULTIVATED: *E. Aubertii*, 1 ft., Nata, Guatemala, etc.; *conforme*, 6 in., Tropics; *crinitum*, 'Elephant-ear Fern', 4 to 18 in., W. Indies; *decoratum*, 1 ft., W. Indies; *Herminieri*, 1 to 2 ft., W. Indies; *magnum*, 1 to 2 ft., Brit. Guiana; *muscosum*, 6 to 12 in., Trop. America; *scolopendrifolium*, 1 ft., Brazil; *squamosum*, 8 to 12 in., Sumatra, Sandwich Is., Azores, etc.; *viscosum*, 6 to 12 in., Cuba, Trop. America.

GREENHOUSE SPECIES CULTIVATED: *E. Bluemeanum*, 4 to 6 in., Assam.

Elder, see *Sambucus*.

Elderberry, see *Sambucus nigra*.

Elecampane, see *Inula Helenium*.

Eleocharis (Spike Rush)—*Cyperaceae*. Marsh grasses.

CULTURE: Soil, aquarium compost. Plant, any time.

PROPAGATION: Division, any time during growing season.

SPECIES CULTIVATED: *E. acicularis*, the elegant appearance makes it suitable for growing submerged in an aquarium, Europe (Br.), Australia.

Elephant-ear Fern, see *Elaphoglossum crinitum*.

Elephant's Foot, see *Testudinaria elephantipes*.

Elisena—*Amaryllidaceae*. Warm greenhouse bulbous plant. First introduced early nineteenth century.

CULTURE: Compost, two parts light sandy loam, one part leaf-mould and one part of coarse sand. Position, well-drained pots in warm, sunny greenhouse. Pot, autumn. Water freely during growing period. Keep nearly dry when at rest. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By offsets removed and treated as parent bulbs at potting time.

SPECIES CULTIVATED: *E. longipetala*, white, spring, 3 ft., Peru.

Elisma, see *Luronium*.

Elm, see *Ulmus*.

Elodea—*Hydrocharitaceae*. Useful oxygenating plants for the aquarium or pond.

CULTURE: Soil, aquarium compost or loam. Plant any time during spring or summer, weight clumps with lead or stone and sink in position.

PROPAGATION: Slips taken any time during growing season.

SPECIES CULTIVATED: *E. callitrichoides*, Argentine, Australia; *densa* (syn. *Anacharis canadensis* var. *gigantea*), small white flowers enclosed by broad loose spathe, S. America. For *E. crispa* see *Lagarosiphon*.

Elsholtzia—*Labiatae*. A semi-woody shrub, with growths usually dying back in winter but throwing up flowering stems each summer. First introduced early twentieth century.

CULTURE: Ordinary, rich garden soil, full sun. Prune back dead shoots in April.

PROPAGATION: Aug. cuttings in frames.

SPECIES CULTIVATED: *E. Stauntonii*, rose-lilac flowers in panicles, autumn, 5 ft., China.

Embothrium—*Proteaceae*. Rather tender evergreen shrub. First introduced mid-nineteenth century.

OUTDOOR CULTURE: Soil, sandy peat, dislikes lime. Position, against south walls outdoors S. of England, pots in cold greenhouse N. of England. Protect with mats in severe weather. Plant, March or April.

GREENHOUSE CULTURE: Compost, two parts peat, one part loam, and one part sand. Pot, March. Prune, March. Water moderately Oct. to April, freely in summer. Place plants in sunny position outdoors May to Oct.

PROPAGATION: By cuttings inserted in sandy peat under bell-glass in temp. 55° in spring; also by cuttings of roots inserted in sandy peat in temp. 75° in spring; by grafting young shoots on portions of its own roots in spring; also by sowing imported or home-saved seeds in sandy peat, in temp. 75°, in spring.

SPECIES CULTIVATED: *E. coccineum*, 'Firebush', bright scarlet, honeysuckle-shaped, of great beauty, May to June, 10 to 30 ft., Chile, var. *longifolium*, probably more hardy.

Emilia—*Compositae*. Half-hardy annual.

CULTURE: Soil, rich loam. Position, sunny beds and borders. Sow seed in boxes or pans in warm greenhouse in Feb. or March, pricking out seedlings into boxes as soon as large enough to handle, and hardening off for planting out in May.

SPECIES CULTIVATED: *E. sagittata* (syn. *E. flammea*, *Cacalia coccinea*), scarlet, summer, 1 to 2 ft., Trop. America.

Empetrum—*Empetraceae*. Hardy evergreen fruiting shrub with black edible berries ripe in Sept.

CULTURE: Soil, boggy. Position, damp, moist, shady. Plant, March or April.

PROPAGATION: By cuttings inserted in June, July or Aug. in sandy peat under bell-glass in shady position.

SPECIES CULTIVATED: *E. nigrum*, 'Crowberry', pink, May, 8 to 10 in., N. Hemisphere, var. *purpureum*, red or purple fruits.

Encephalartos (Caffer Bread)—*Cycadaceae*. Greenhouse evergreen plants. First introduced early nineteenth century. Leaves, feather-shaped, bluish-green.

CULTURE: Compost, two parts good loam, one part sand. Position, well-drained pots in light part of greenhouse. Repot, March. Water liberally April to Aug., very little afterwards. Growth may appear to cease for a few years. Temp., Sept. to April 55° to 60°, April to Sept. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in light soil in temp. 85° to 95° in March or April.

SPECIES CULTIVATED: *E. Altensteinii*, 8 ft., S. Africa; *caffra*, 'Caffer Bread', 8 to 10 ft., S. Africa; *horridus*, 8 to 10 ft., S. Africa.

Endive, see *Cichorium Endivia*.

Enkianthus—*Ericaceae*. Hardy deciduous shrubs with small bell-shaped flowers in spring and autumn-tinted foliage.

CULTURE: Soil, ordinary, moist, with a little peat and leaf-mould. Position, warm, sheltered shrubberies or beds. Plant, Sept. or April. No pruning required.

PROPAGATION: By cuttings of firm shoots in sandy soil in heat in spring, or seed sown in peaty soil in spring.

SPECIES CULTIVATED: *E. campanulatus*, cream, May, 20 ft., Japan, var. *Palibinii*, flowers red; *cernuus*, cream, May, 12 ft., Japan, var. *rubens*, flowers deep red; *chinensis* (syn. *E. sinohimalaicus*), a strong-growing species, salmon-orange, May, W. China; *perulatus* (syn. *E. japonicus*), 4 ft., white, Japan.

Eomecon—*Papaveraceae*. Hardy, rhizomatous, herbaceous, poppy-like perennial. First introduced late nineteenth century.

CULTURE: Soil, sandy peat and leaf-mould. Position, sunny, well-drained border. Plant, Oct. to March. Water freely in very dry weather.

PROPAGATION: By division of the roots in March or early April.

SPECIES CULTIVATED: *E. chionantha*, 'Snow Poppy', white, summer, 1 to 2 ft., China.

Epacris (Australian Heath)—*Epacridaceae*. Greenhouse evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, three-fourths fibrous peat, one-fourth silver sand. Position, light airy greenhouse Sept. to July, sunny place outdoors July to Sept. Repot, April, May or June; good drainage essential. Prune shoots of erect kinds to within 1 in. of base directly after flowering; pendulous kinds about half-way. Water moderately at all times. Syringe plants daily March to July. Temp., Sept. to March 45° to 50°, March to July 55° to 60°. Stimulants not essential.

PROPAGATION: By seeds sown immediately they ripen on surface of sandy peat under bell-glass in temp. 55°; cuttings of ends of shoots inserted in pots of sandy peat covered with bell-glass placed in cool greenhouse in Aug. or April.

SPECIES CULTIVATED: *E. impressa*, white and red, March, loosely branched, Australia; *longiflora*, crimson and white, May and June, 2 to 4 ft., Australia, var. *splendens*, red, tipped white; *purpurascens*, white and red, winter, 2 to 3 ft., Australia. Numerous vars. and hybrids will be found in trade lists.

Ephedra (Shrubby Horsetail)—*Ephedraceae*. Hardy evergreen shrubs resembling the wild horse-tail, of little ornamental value.

CULTURE: Soil, a well-drained loam. Position, sunny banks where the branches can sprawl about. Plant in autumn.

PROPAGATION: By layering the branches in summer.

SPECIES CULTIVATED: *E. distachya*, branchlets rigid, 3 to 4 ft., S. Europe; *Gerardiana*, branchlets slender and spreading, 2 ft., Himalaya, etc.; *minuta*, prostrate, 3 to 6 in., China; *major* (syn. *E. nebrodensis*), branchlets prostrate, 3 ft. N. Africa; *procera*, to 6 ft., Greece to Caucasus.

× **Epicattleya**—*Orchidaceae*. Bigenic hybrid between *Epidendrum* and *Cattleya*. The habit is intermediate between the two genera. Flowers borne in terminal spikes.

CULTURE: Similar to Cattleyas with consideration regarding temp. if a cross between a cool-growing species and one requiring more warmth.

Epidendrum—*Orchidaceae*. Epiphytic orchids, native in Trop. America. Allied to Cattleya. Probably over 1000 species, very variable, including some of dwarf habit. Decided pseudo-bulbs in many, in others stemlike, slender or stout, short or tall, fleshy stems and fleshy leaves or otherwise. The inflorescence terminal with a few exceptions, flowers solitary, racemose or in panicles. A number of hybrids have been raised.

CULTURE: The hard-bulbed, hard-leaved species must have a decided rest in winter, most of them about 50°. In summer, rising to 80° or more with sun heat. The stemmed section mostly needs a winter temp. of 60° and a more humid atmosphere throughout the year, rising in summer to 80° or more with shading. Variation is so great that slight differences are necessary in treatment. The *Nanodes* section needs a moist atmosphere throughout the year, though high temps. may not be needed. Compost as for Cattleyas. The Cattleya house provides suitable conditions for a large number but the *Barkeria* section is suited in the cool house, suspended near the glass and though with slender pseudo-bulbs needs only occasional waterings, if any, in winter.

PROPAGATION: By division of plants. Stemmed kinds which emit stem roots by cuttings taken off below roots.

SPECIES CULTIVATED: A selection only—*E. advena* (syns. *E. Caprartianum*, *E. osmanthum*), summer, Brazil; *aromaticum*, very fragrant, in panicles, yellowish, lip whitish with red striations, summer, Mexico, Guatemala; *atropurpureum* (syn. *E. macrochilum*), dark brownish, lip white, crimson-purple, very variable, var. *album*, has a pure white lip; *Brassavolae*, yellow, lip whitish and purple, spring, summer, Guatemala; *ciliare*, white, lip fringed, various seasons, Trop. America; *cyclotellum* (syn. *Barkeria cyclotellum*), spring, Mexico, Guatemala; *dichromum*, whitish, rose-flushed, crimson-purple, summer, Brazil, var. *amabile* (syn. *E. amabile*), rosy, crimson-purple, white; *Endresii*, whitish, rose, violet spots on lip, purplish streaked, various seasons, Costa Rica; *fragrans*, dwarf, white, lip purple streaked, various seasons, Cent. America; *Frederici Gulielmii*, crimson-purple, summer, Peru; *ibaguense*, orange-yellow to red, various seasons, Colombia, Ecuador; *Lindleyanum* (syn. *Barkeria Lindleyana*), rose-purple, variable, autumn, Mexico; *Mathewsii* (syn. *Nanodes Mathewsii*), dwarf, purplish, Peru, Cent. America; *Medusae* (syn. *Nanodes Medusae*), yellowish-green, lip purple-brown, fringed, Costa Rica; *melanocaulon* (syn. *Barkeria melanocaulon*), rose-red, late summer, Mexico; *nemorale*, rose-mauve, lip whitish and purple, decided rest, summer, Mexico, var. *majus*, larger, lip whitish, rose-bordered; *oncidoides* (syn. *E. Mooreanum*), yellowish, red-brown, lip white and purplish, spring, summer, Brazil; *pentotis* (syn. *E. fragrans megalanthum*), in twos, creamy-white, lip purple-striped, very fragrant, autumn, Brazil; *prismatocarpum*, yellowish-white, purplish-spotted, summer, Cent. America; *radicans* (syn. *E. rhizophorum*), orange-scarlet, various seasons, Mexico, Guatemala; *Skinneri* (syn. *Barkeria Skinneri*), deep rose, autumn, Guatemala; *Stamfordianum*, variable, flowers on abortive basal growths, yellow, red-spotted, lip lobed, fringed, fragrant, spring, summer, Cent. America; *Wallisii*, golden-yellow, maroon-spotted, lip feathered with purple, various seasons, Colombia; *xanthinum*, yellow or orange-yellow, various seasons, Brazil.

Epigaea—*Ericaceae*. Hardy evergreen perennial with woody creeping stems. First introduced mid-eighteenth century.

CULTURE: Soil, sandy peat. Position, shady borders or rockeries. Plant, Sept., Oct. or April.

PROPAGATION: By division of plant in Oct. or April; seeds sown as soon as ripe.

SPECIES CULTIVATED: *E. asiatica*, pink, May, Japan; *intertexta*, pink, May, hybrid; *repens*, 'American Ground Laurel', 'New England Mayflower', 'Trailing Arbutus', white, fragrant, May, trailing, N. America.

× **Epilaelia**—*Orchidaceae*. Bigeneric hybrid between *Epidendrum* and *Laelia*.

The habit is intermediate between the genera. Flowers are borne on erect scapes. About 30 hybrids have been raised.

CULTURE: As Cattleyas, but when derived from a warm growing and cool house species the individual plant must be studied as one species may slightly predominate.

Epilobium (Willow Herb)—*Onagraceae*. Hardy perennial herbs. Showy plants for wild gardens.

CULTURE: Soil, ordinary. Position, shady or sunny borders, or sides of water-courses. Dwarf species in sunny rock gardens. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shady position outdoors in March, April or Aug.; division of roots in Oct. or March.

SPECIES CULTIVATED: *E. angustifolium*, 'Rose Bay' or 'French Willow', crimson, July, 4 to 8 ft., Europe (Br.), var. *album*, white; *Dodonaei* (syn. *Chamaenerion palustre*), rosy purple, Aug., 9 to 12 in., Europe; *Hectori*, pale pink, summer, 4 to 6 in., New Zealand; *hirsutum*, 'Codlins and Cream', pink or white, July, 4 ft., Britain; *luteum*, yellow, summer, 6 in., N. America; *macropus*, creamy-white, summer, creeping, New Zealand; *obcordatum*, rosy purple, summer, 6 in., California.

Epimedium (Barrenwort)—*Berberidaceae*. Hardy herbaceous perennials. First introduced late sixteenth century.

CULTURE: Soil, sandy loam, preferably enriched with leaf-mould or peat. Position, cool shady border or rock garden; will do well under trees. Plant, autumn or spring.

PROPAGATION: By division of rhizomes in autumn.

SPECIES CULTIVATED: *E. alpinum*, 'Bishop's Hat', garnet-red and yellow, April, 9 in., S. Europe; *diphyllum* (syn. *Aceranthus diphyllus*), white, April, 6 in., Japan; *grandiflorum* (syn. *E. macranthum*), pale violet and white, April, 9 in., Japan, and vars. *flavescens*, pale yellow, *violaceum*, violet; *Perralderianum*, bright yellow, April, 9 in., Algeria; *pinnatum colchicum*, bright yellow, April, 9 in., Caucasus; *pubigerum*, white, pink and yellow, April, 15 in., Bulgaria, Turkey, Caucasus; *rubrum* (syn. *E. alpinum rubrum*), crimson and yellow, April, 9 in., hybrid; *versicolor*, old rose and yellow, April, 12 in., hybrid, and vars. *neo-sulphureum* and *sulphureum* (syn. *E. sulphureum*), sulphur-yellow; *warleyense*, coppery-red and yellow, April, 12 in., hybrid; *Youngianum* (syn. *Bonstedtia Youngiana*), greenish-white, 9 in., April, Japan, and vars. *niveum* (syn. *E. niveum*), white, 6 in., *roseum* (syn. *E. concinnum*), rose, 6 in.

Epipactis—*Orchidaceae*. Hardy terrestrial orchids.

CULTURE: For the British species: Position, moist, shady borders or near ponds or rivulets. Plant in early autumn. Collect wild specimens directly after flowering.

PROPAGATION: By division of plant in March or April.

SPECIES CULTIVATED: *E. gigantea*, green and rose, striped red, June to Aug., 3 ft., W.N. America and Mexico; *helleborine* (syn. *E. latifolia*), 'Helleborine', purple, July, 1 ft., gravelly loam, Europe (Br.); *palustris*, purple, July, 1 ft., moist, marshy ground on limestone or chalk, Europe (Br.).

× **Epiphronitis**—*Orchidaceae*. Bigeneric hybrid between *Sophronitis* and *Epidendrum*.

CULTURE: As for stemmed *Epidendrums*. So far only two crosses have been recorded, temp., etc., may depend on the *Epidendrum* species used; if one with decided pseudo-bulbs, temp. and winter treatment must be modified. *E. Veitchii* is a cross between *Sophronitis coccinea* (syn. *E. grandiflora*) and *Epidendrum radicans*; it succeeds best in a temp. of 60° in winter and near that in summer, but the individual plants vary slightly.

SPECIES CULTIVATED: *E. Veitchii*, short, leafy, often branched stems terminating in scarlet flowers.

Epiphyllum—*Cactaceae*. Succulent greenhouse plants. Some species formerly

included in this genus have now been transferred to *Nopalxochia*, *Schlumbergera*, *Zygocactus*, etc. First introduced early nineteenth century.

CULTURE: Compost, equal parts turfy loam, peat and leaf-mould, one-fourth part silver sand. Position, light warm greenhouse Sept. to June, sunny place outdoors or cold frame June to Sept. Water moderately Sept. to April, little more freely other times. Temp., Nov. to March 50° to 60°, March to June 55° to 65°, Sept. to Nov. 40° to 45°.

PROPAGATION: By cuttings of stems in sand; seeds sown in well-drained pans.

SPECIES CULTIVATED: *E. anguliger*, yellow, fragrant, autumn, 1 to 2 ft., Mexico; *crenatum*, white, fragrant, summer, Honduras; *Hookeri*, white, fragrant, summer, 2 to 3 ft., Brazil.

Episcia—*Gesneriaceae*. Stove herbaceous perennials. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts fibrous loam, peat and leaf-mould with sharp sand added. Position, large pans or hanging baskets in shady part of stove or warm greenhouse. Pot or plant, March or April. Water moderately at all times. Feed with liquid manure when plants established. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings inserted in sandy peat in temp. 75° to 85° in March or April.

SPECIES CULTIVATED: *E. chontalensis*, lilac, white and yellow, autumn, winter, trailing, Nicaragua; *fulgida*, scarlet, July, trailing, Colombia.

Equisetum (Horsetail; Fox-tailed Asparagus)—*Equisetaceae*. Hardy deciduous herbaceous perennials. Leaves, green, narrow, rush-like.

CULTURE: Soil, ordinary. Position, bogs, margins of ponds, moist shady corners, or in pots in a cool shady greenhouse. Plant or pot, April. Water plants in pots freely while growing, moderately at other times.

PROPAGATION: By division of rootstocks in March or April.

SPECIES CULTIVATED: *E. maximum* (syn. *E. Telmateia*), 2 to 6 ft., Britain; *pratense* (syn. *E. robustum*), to 11 ft., N. America, Asia.

Eragrostis—*Gramineae*. Hardy annual flowering grasses. Native to Temperate Regions. Inflorescence, light, feathery and graceful.

CULTURE: Soil, ordinary. Position, open sunny beds or borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep where plants are to grow in April. Gather inflorescence in July and dry for winter use.

SPECIES CULTIVATED: *E. abyssinica*, 2 to 3 ft., N. Africa; *maxima*, 2 to 3 ft., Madagascar; *pilosa*, 1 to 1½ ft., Europe; *suaveolens*, 2 to 3 ft., W. Asia; *tenella* (syn. *E. elegans*), 2 to 3 ft., Japan.

Eranthemum—*Acanthaceae*. Stove flowering plants with ornamental foliage. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, leaf-mould, loam and sand. Position, well-drained pots in light stove Sept. to June, sunny frame June to Sept. Pot, March or April. Water moderately in winter, freely other times. Temp., Sept. to March 55° to 65°, March to June 65° to 75°. Prune shoots to within 1 in. of base after flowering. Apply liquid or artificial manure occasionally to plants when well rooted in final pots.

PROPAGATION: By cuttings of young shoots inserted in sandy peat under bell-glass in temp. 75° March to July.

SPECIES CULTIVATED: *E. Andersonii*, white and purple, autumn, 1 ft., Malaya; *cinnabarinum*, scarlet, winter, 3 ft., Burma; *Cooperi*, white and purple, June, 2 ft., New Caledonia; *Moorei*, canary yellow, distinct, Polynesia; *nervosum*, blue, April, to 4 ft., India; *purpurescens*, pale blue, 18 in., Trop. Africa; *tricolor*, green, purple and pink, Polynesia; *variabile*, white, crimson and pink, Australia; *Wattii*, purple, 12 in., Trop. Africa.

Eranthis (Winter Aconite)—*Ranunculaceae*. Hardy tuberous-rooted perennial. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, shady borders, beds, lawns, under trees or on rockeries. Plant 2 in. deep and 2 in. apart in Oct. to Dec. Tubers should not be lifted, but left permanently in the soil.

POT CULTURE: Compost, equal parts leaf-mould, loam and sand. Position, 3 in. pots or large pans in cool greenhouse or window. Plant tubers $\frac{1}{2}$ in. deep and close together in pots or pans in Oct. or Nov. Water moderately. After flowering, plant tubers out in borders.

PROPAGATION: By division of tubers in Oct. or Nov.

SPECIES CULTIVATED: *E. hyemalis*, yellow, Jan. to March, 3 to 4 in., Europe (Br.), var. *cilicica*, broader sepals; *sibirica*, yellow, Jan. to March, 2 to 3 in., Siberia; *Tubergenii*, large, shiny, golden-yellow, hybrid.

Ercilla—*Phytolaccaceae*. Hardy evergreen creeping or climbing shrub. First introduced early nineteenth century.

CULTURE: Soil, sandy loam. Position, south walls or old tree trunks; sunny. Plant, Sept. or April. Prune after flowering, cutting away weak and shortening strong shoots one-fourth. Shoots cling to the wall like those of ivy.

PROPAGATION: By cuttings or layers in autumn.

SPECIES CULTIVATED: *E. spicata* (syn. *Bridgesia spicata*), purple, spring, berries, 10 to 15 ft., Chile.

Eremostachys (Desert Rod)—*Labiatae*. Hardy perennial. First introduced early eighteenth century.

CULTURE: Soil, light, rich. Position, sunny well-drained borders. Plant, Oct. or April. Cut off spikes after flowering.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in sunny position outdoors in April; division of roots in Oct. or April.

SPECIES CULTIVATED: *E. laciniata*, yellow, summer, 2½ ft., Asia Minor.

Eremurus—*Liliaceae*. Hardy herbaceous perennials with thick fibrous or cord-like roots. First introduced early nineteenth century.

CULTURE: Soil, light, deep, rich, sandy, well-manured loam. Position, sunny well-drained beds or borders. Plant, Sept. or Oct. Transplanting must not be done oftener than is really necessary. Mulch freely with well-decayed manure in autumn. Water copiously in hot weather. Protect in winter by a covering of bracken or dry litter.

PROPAGATION: By division of roots in Oct. or March; seeds sown in heat in spring, growing seedlings on in cold frame for first three years. Seeds sometimes take a long time to germinate.

SPECIES CULTIVATED: *E. Bungei*, yellow, June and July, 1 to 3 ft., Persia; *himalaicus*, white, May and June, 8 ft., Himalaya; *Kaufmannii*, yellow, June, 4 ft., Turkistan; *Olgae*, lilac-purple, fragrant, 2 to 4 ft., Turkistan; *robustus*, 'Fox-tail Lily' pink, May and June, 6 to 10 ft., Turkistan; *Shelfordii*, orange, July, 3 to 4 ft., hybrid; *spectabilis*, yellow and orange, June, 2 to 4 ft., Siberia. A number of hybrids are offered in trade lists.

Erepsia—*Aizoaceae*. Greenhouse, shrubby, succulent plants, formerly included in *Mesembryanthemum*.

CULTURE: As *Mesembryanthemum*.

PROPAGATION: As *Mesembryanthemum*.

SPECIES CULTIVATED: *E. Haworthii* (syn. *Mesembryanthemum Haworthii*), purple, summer, 1½ ft., S. Africa; *inclaudens* (syn. *M. inclaudens*), purplish-pink, June, 1½ ft., S. Africa.

Eria—*Orchidaceae*. A large epiphytal genus allied to *Dendrobium*, but of less importance. In many the flowers, though freely produced, are small and have little attraction. Considerable variation is present in the genus. Pseudo-bulbs and stems are present. Inflorescence terminal, near the apices of the pseudo-bulbs, with the young growths lateral or axillary.

CULTURE: Compost, etc., as for *Dendrobium*, the nature of the species must have consideration as regards resting. The intermediate house with winter night

temp. around 60° is suitable for the majority, but species from the Far East should be kept at 70°. The floral bracts in some are showy.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection—*E. bicolor*, white, bracts yellowish, spring, Ceylon; *bractescens*, white, red, bracts yellowish, summer, Burma, Java; *convallarioides*, creamy-white, small, many, summer, India, Burma; *globifera*, single, inverted, creamy-white, reddish, winter, Annam; *ornata*, fuscous-brown, reddish, bracts large, orange-cinnabar, summer, Malaya, Java; *pannea*, curious, white, lip orange, red, pendent habit, woolly, small raft, various seasons, Burma; *rhynchostyloides*, white, rose-flushed, up to 300, summer, autumn, Java; *vestitia*, whitish, yellowish, pendent habit, brown-haired, summer, Malaya, Philippines.

Erianthus (Woolly Beard Grass)—*Gramineae*. Hardy ornamental perennial grass. Inflorescence similar to pampas plumes.

CULTURE: Soil, deep loam. Position, sunny well-drained lawns or borders. Plant, March or April.

PROPAGATION: By division of roots in March or April.

SPECIES CULTIVATED: *E. Ravennae*, 'Ravenna Grass', 6 to 12 ft., S. Europe to India.

Erica (Heath)—*Ericaceae*. Hardy and greenhouse flowering shrubs. The hardy kinds are of great garden value, suitable selections providing colour the whole year round. The majority of these are dwarf-growing but a few species reach small-tree dimensions.

CULTURE OF HARDY SPECIES: A peaty soil, preferably light and well-drained, but at any rate lime-free. *Erica carnea* and its vars. and *E. darleyensis* will grow in chalky soils. Choose open situation and plant in clumps or drifts on rockeries or margins of borders or massed on banks or in the wild garden. If compact growth is desired, remove spent stems after flowering.

CULTURE OF GREENHOUSE SPECIES: Compost, two-thirds fibrous peat, one-third silver sand. Position, well-drained pots in light airy greenhouse Oct. to July, sunny place outdoors July to Oct. Repot autumn- and winter-flowering kinds in March, summer-flowering kinds in Sept. Press the compost firmly in pots. Water carefully always, giving sufficient to keep soil uniformly moist; rain, not spring water, essential. Prune shoots to within 1 or 2 in. of base immediately after flowering. Temp., Oct. to March 40° to 45°, March to July 45° to 55°. Soot-water best stimulant.

PROPAGATION: Greenhouse species by cuttings of shoots 1 in. long inserted in well-drained pot of sandy peat under bell-glass in temp. 60° to 70° in spring; hardy species by cuttings inserted in sandy peat under bell-glass or hand-light in gentle bottom heat during July and August; division of plants in Oct.; layering shoots in spring.

HARDY SPECIES CULTIVATED: *E. arborea*, 'Tree Heath', white, fragrant, May, handsome grey foliage, 10 to 20 ft., hardy only in south, Medit., var. *alpina*, similar, but hardy, 8 ft., Spain; *australis*, 'Spanish Heath', rather tender, rosy red, April, May, 3 to 4 ft., Spain; *carnea*, dwarf to 18 in., winter flowering, Cent. Europe, in many vars.; *ciliaris*, 'Dorset Heath', 1 ft., summer, rosy-red, S.W. Europe and S.W. England, with var. *Maweana*, rosy crimson; *cinerea*, 'Bell Heather', 1 ft., June till Sept., purple, W. Europe, including British moorland, with vars. *alba*, *atropurpurea*, *atrorubens* and *fulgida*; *darleyensis* (syn. *E. mediterranea hybrida*), very easily grown, rose-lilac, Nov. till May, 18 in., hybrid; *lusitanica* (syn. *E. codonodes*), rather tender, pretty foliage, pale rose, Feb. to April, S.W. Europe; *mediterranea*, hardiest of tree heaths, 6 to 10 ft., rosy-lilac, honey-scented, March to May, W. Europe, vars. *alba*, *superba*; *stricta* (syn. *E. corsica*), 'Corsican Heath', hardy tree heath, 8 ft. to 10 ft., erect, pale rose, June to Sept., Spain, Italy, Corsica; *Tetralix*, 'Cross-leaved Heath', to 18 in., rose-pink, June to Oct., Europe, including Britain, with vars. *mollis*, silver foliage, white flowers, and *rubra*, dark red; *umbellata*, trailing, cerise, May, not fully hardy, Spain; *vagans*, 'Cornish Heath', 2 ft., spreading to 5 ft. wide, rosy-lilac, July to Oct., with

numerous vars.; *Veitchii*, a hybrid between *lusitanica* and *arborea*, a vigorous counterpart of the former.

GREENHOUSE SPECIES CULTIVATED: *E. Bergiana* (syn. *E. cupressina*) red, May to June, 1 to 3 ft., S. Africa; *caffra*, white, May, 18 in., S. Africa; *canaliculata* (often cult. as *E. melanthera*), rose, winter, 2 to 5 ft., S. Africa; *Cavendishiana*, yellow, May, 4 ft., hybrid; *coccinea*, scarlet, June, 1 ft., S. Africa; *glauca* (syn. *E. elegans*), rose and green, Aug., 6 in., S. Africa; *gracilis*, reddish-purple, 1 ft., S. Africa; *hyemalis*, pink, Dec. to March, hybrid; *mammosa*, reddish-purple, July to Oct., 2 ft., S. Africa; *melanthera*, rose, winter, 2 to 3 ft., S. Africa; *Pageana*, yellow, 1 to 2 ft., Sept. to Oct., Cape; *regerminans*, pale red, May to Aug., to 2 ft., S. Africa; *subdivaricata* (syn. *E. persoluta*), purple, April, 16 in., S. Africa; *ventricosa*, pink, June, 1 ft., S. Africa, and numerous vars.

Erigeron (Fleabane)—*Compositae*. Hardy herbaceous perennials. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, sunny moist rockeries or borders. Plant, Oct. or March. Cut down stems after flowering.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in shady position outdoors in April, May or June; division of roots in Oct. or March.

SPECIES CULTIVATED: *E. alpinus* (syn. *E. Roylei*), purple and yellow, Aug., 12 in., Northern Regions; *aurantiacus*, 'Orange Daisy', orange, summer, 12 in., Turkistan; *aureus*, bright gold, spring onwards, 4 in., N. America; *compositus*, purple, summer, 3 in., N. America; *Karvinskianus* (syn. *E. mucronatus*), white, pink, and yellow, summer, 12 in., more or less trailing, Mexico; *leromerus*, lavender, summer, 3 to 4 in., N.W. America; *macranthus*, violet-blue, June to Sept., 1 ft., N.W. America; *philadelphicus*, lilac-pink, summer, 1 to 2 ft., N. America; *speciosus* (syn. *Stenactis speciosa*), violet blue, summer, $1\frac{1}{2}$ to 2 ft., N. America; *trifidus*, deep lavender, May to June, 2 to 3 in., N. America; *ursinus*, rich purple, gold centre, May to July, 6 in., N. America.

Erinacea—*Leguminosae*. Dwarf deciduous spring-flowering shrub. Introduced mid-eighteenth century.

CULTURE: Soil, loam and peat. Position, sunny rockeries, or borders at base of a south wall. Plant, May or Sept.

PROPAGATION: By cuttings in sandy loam and peat in a cold frame in autumn; seed.

SPECIES CULTIVATED: *E. Anthyllis* (syn. *E. pungens*), 'Hedgehog Broom', pale blue, spring, 1 ft., Spain.

Erinus—*Scrophulariaceae*. Hardy tufted perennial. First introduced early eighteenth century.

CULTURE: Soil, decayed vegetable mould and old mortar. Position, crevices of old sunny walls or dryish rockeries. Plant, March or April.

PROPAGATION: By seeds sown where plants are to grow in April; division of plants in April.

SPECIES CULTIVATED: *E. alpinus*, violet-purple, spring, 6 in., Pyrenees, and vars.

Eriobotrya—*Rosaceae*. Rather tender evergreen flowering shrub. The edible fruit of loquat is about the size of a green walnut, pale orange-red, downy, borne in bunches.

OUTDOOR CULTURE: Soil, light, deep loam. Position, against south walls S. and S.W. of England and Ireland only. Plant, Sept. to Nov., April or May. Prune, April. Protect in severe weather with mats or straw hurdles.

INDOOR CULTURE: Soil, two parts sandy loam, one part leaf-mould. Position, beds against back wall of cold or slightly heated sunny greenhouse. Plant, Oct. or April. Water moderately Sept. to April, freely afterwards. Syringe daily May to Sept. Prune straggling shoots in April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in pots of light soil in cold greenhouse or frame, spring or autumn; cuttings of firm shoots inserted in sandy soil in cold frame or greenhouse, Aug.

SPECIES CULTIVATED: *E. japonica* (syn. *Photinia japonica*), 'Loquat', white, summer, 10 to 30 ft., China and Japan.

Eriodendron, see *Ceiba*.

Eriogonum—*Polygonaceae*. Hardy herbaceous perennial.

CULTURE: Soil, ordinary. Position, open borders. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil outdoors in April; division of roots in March.

SPECIES CULTIVATED: *E. Allenii*, bronze, late summer, 9 to 12 in., N. America; *depressum*, white, summer, 3 to 4 in., N. America; *Jamesonii*, cream, June to July, 9 in., N. America; *ovalifolium*, yellow turning purplish, 3 in., summer, W.N. America; *subalpinum*, white flushed rose, late summer, 9 in., N. America; *umbellatum*, golden yellow, summer, 12 in., N.W. Africa.

Eriophorum (Cotton Grass)—*Cyperaceae*. Hardy aquatic perennials. Inflorescence borne in spikelets, with cottony tufts on their extremities.

CULTURE: Soil, ordinary. Position, margins of ponds. Plant, March.

PROPAGATION: By seeds sown where plants are to grow; division of plants in March.

SPECIES CULTIVATED: *E. alpinum*, 1 ft., N. Hemisphere; *angustifolium*, 15 in., Britain; *latifolium*, 12 to 18 in., N. Temp. and Frigid Regions; *vaginatium*, 1 ft., Britain.

Eriophyllum—*Compositae*. Hardy perennial herb with white tomentose leaves.

CULTURE: Soil, ordinary. Position, sunny border. Plant, Oct. to April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in April or division in March.

SPECIES CULTIVATED: *E. caespitosum* (syn. *Bahia lanata*), yellow, May to Aug., 12 to 18 in., California.

Eriopsis—*Orchidaceae*. An epiphytic evergreen genus with stout pseudo-bulbs from the base of which long flower spikes are produced, many flowers one inch or more across.

CULTURE: Compost, three parts osmunda fibre, one part sphagnum moss. Baskets or well-drained pans. Rest in winter with occasional waterings, 60°. Summer temp. 65° to 80°. Water freely, moderate shading, expose to light in autumn.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *E. biloba* (syn. *E. Schomburgkii*), dark yellow to brown, lip purple-spotted, summer, Peru, Guiana, Brazil; *Heleniae*, yellow, orange-yellow, red, purplish-red, pots, summer, Peru; *rutidobulbon*, orange, purplish, lip purple-dotted, summer, Colombia.

Eriostemon—*Rutaceae*. Greenhouse evergreen shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy loam and peat. Position, well-drained pots in light airy greenhouse. Repot, March, pressing soil down firmly. Water moderately Sept. to April, freely afterwards. Prune straggly growths in Feb. Temp., Sept. to April 45° to 50°, April to Sept. 50° to 60°. Ventilate greenhouse freely in summer.

PROPAGATION: By cuttings 2 in. long inserted in sandy peat under bell-glass in temp. 60° in March; grafting on *Correa alba* in March.

SPECIES CULTIVATED: *E. buxifolius*, pink, May or June, 3 to 4 ft., Australia; *intermedius*, white and pink, April, 3 ft., garden origin; *myoporoides*, rose, March, 1 to 2 ft., Australia; *pulchellus*, pink, May, 2 to 3 ft., hybrid; *salicifolius*, red, spring, 2 ft., Australia.

Eritrichium—*Boraginaceae*. Hardy perennial alpine plant. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts broken limestone, sandstone, fibrous loam, peat and sand. Position, sheltered crannies of open rockeries, where foliage can

be protected from excessive moisture in winter. Plant, April. Protect by panes of glass in rainy weather.

PROPAGATION: By division of plants in April; seeds sown in gentle heat in spring.

SPECIES CULTIVATED: *E. nanum*, 'Fairy Borage', 'Fairy Forget-me-not', sky-blue and yellow, summer, 2 to 3 in., N. Temp. Regions; *strictum*, blue, 6 in., all summer, Asia.

Erodium (Heron's Bill)—*Geraniaceae*. Hardy perennial herbs. First introduced early seventeenth century.

CULTURE: Soil, sandy. Position, dry sunny borders or rockeries. Plant, March or April. Transplant very seldom.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pots of sandy soil in temp. 55° in March or April, transplanting seedlings outdoors in June or July; division of roots in April.

SPECIES CULTIVATED: *E. absinthioides* (syn. *E. olympicum*), rosy lilac, summer, 6 in., Asia Minor; *chamaedryoides*, white and pink, April to Sept., 2 to 3 in., Balearic Islands; *chrysanthum*, pale yellow, summer, 6 in., Greece; *corsicum*, pink, summer, trailing, Corsica and Sardinia; *guttatum*, pink, summer, 6 in., Medit. Region; *macradenum* violet, flesh and purple, summer, 6 in., Pyrenees; *Manescavii*, purplish-red, summer, 1 to 2 ft., Pyrenees; *Mouretii*, 6 to 12 in., white, red veining, Morocco; *trichomanefolium*, violet-veined rose, summer, 4 to 6 in., Syria.

Eryngium—*Umbelliferae*. Hardy perennial herbs with spiny-toothed leaves; flower heads surrounded by spiny, coloured bracts.

CULTURE: Soil, light sandy. Position, sunny borders. Plant, Oct., Nov., March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in boxes of sandy soil in cold frame in April or May; division of plants in Oct. or April; root cuttings.

SPECIES CULTIVATED: *E. alpinum*, blue and white, summer, 1 to 2 ft., Europe; *amethystinum*, purple, July and Aug., 12 to 18 in., Europe; *Bourgatii*, blue, June to Aug., 1 to 2 ft., Spain; *giganteum*, blue, summer, 3 to 4 ft., Armenia, usually treated as a biennial; *maritimum*, 'Sea Holly', bluish-white, July to Oct., 1 to 2 ft., Britain; *Oliverianum*, blue, summer, 2 to 4 ft., Orient; *pandanifolium*, purplish, summer, 10 to 15 ft., Uruguay; *planum*, blue, summer, 1 to 2 ft., Europe; *Spinalba*, white, summer, 1 ft., Europe; *Zabelii*, amethyst blue, summer, 1½ ft., hybrid.

Eryngo, see *Eryngium*.

Erysimum (Alpine Wallflower)—*Cruciferae*. Hardy annuals, biennials and perennials. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, dryish sunny beds or rockeries. Plant, March or April.

PROPAGATION: Annual species, by seeds sown where plants are required to grow in April; biennials, by seeds sown in sunny place outdoors in June, transplanting seedlings to flowering positions in Aug.; perennials, by seeds sown as advised for biennials, also by cuttings inserted in sandy soil under hand-light or cold frame in Aug.; division of plants in March or April.

ANNUAL SPECIES CULTIVATED: *E. Perofskianum*, reddish-orange, spring to autumn, 1 ft., Afghanistan.

BIENNIAL SPECIES CULTIVATED: *E. Allionii* (syns. *E. Marshallii*, *Cheiranthus Allionii*), 'Siberian Wallflower', orange, spring and summer, 1 to 2 ft., origin unknown, possibly hybrid; *asperum*, orange or yellow, spring and early summer, 1 to 2 ft., N. America; *linifolium* (syn. *Cheiranthus linifolius*), rosy lilac, summer, 1 to 1½ ft., Spain; *ochroleucum*, sulphur-yellow, fragrant, April to July, 1 ft., Europe; *pumilum*, sulphur-yellow, spring and early summer, 6 in., Europe; *purpureum*, purple, spring and summer, 6 in., Asia Minor; *rupestre*, sulphur-yellow, fragrant, spring, 1 ft., Greece; *suffrutescens*, pale yellow, spring and early summer, 1½ to 2 ft., California.

Erythraea, see *Centaureum*.

Erythrina—*Leguminosae*. Half-hardy herbaceous perennials and greenhouse deciduous shrubs, usually thorny. First introduced late seventeenth century.

CULTURE OF SHRUBBY SPECIES: Compost, equal parts loam, peat, well-decayed manure and sand. Position, pot in warm greenhouse, or at base of south wall S. of England. Pot or plant, March. Prune shoots close to old wood in Oct. Water freely April to Sept., keep almost dry thereafter. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°. Store plants in pots on their sides in greenhouse during winter. Place in light part of structure March to June, then in sunny position outdoors. Protect outdoor plants with covering of ashes.

CULTURE OF HERBACEOUS SPECIES: Compost, same as above. Position, pot in warm sunny greenhouse. Pot, March. Cut down flowering stems in autumn. Water freely April to Sept., keep nearly dry afterwards. Temp., Sept. to March 45° to 55°, March to Sept. 60° to 70°.

PROPAGATION: Shrubby species by cuttings of young shoots removed in spring with portion of old wood attached and inserted singly in well-drained pots of sandy peat in temp. 75°; herbaceous species by division in spring.

SHRUBBY SPECIES CULTIVATED: *E. Crista-galli*, 'Coral Tree', scarlet, June to Aug., 6 to 8 ft., Brazil.

HERBACEOUS SPECIES: *E. herbacea*, scarlet, June to Sept., 3 to 4 ft., W. Indies.

Erythronium—*Liliaceae*. Hardy bulbous perennials. First introduced late sixteenth century.

CULTURE: Compost, equal parts loam, peat and leaf-mould. Position, sheltered rockeries, beds, borders, or under shade of trees. Plant bulbs 3 in. deep and 2 in. apart in Aug. Transplant very seldom. Top-dress annually with decayed manure.

POT CULTURE: Compost, same as above. Plant bulbs 1 in. deep and $\frac{1}{2}$ in. apart in well-drained pots in Aug. Store pots in cold frame during winter. Water very little until Feb., then give a moderate supply. Place plants in greenhouse or window in March to flower.

PROPAGATION: By offsets in Aug.; seeds.

SPECIES CULTIVATED: *E. albidum*, white and yellow, April, 6 in., N. America; *americanum*, 'Yellow Adder's-tongue', golden yellow and purple, May, 6 in., N. America; *californicum*, creamy-white, spring, 9 to 12 in., California; *citrinum*, yellow, orange, and pink, spring, 6 in., Oregon; *Dens-canis*, 'Dog's-tooth Violet', rose, spring, 6 in., Europe, and vars.; *grandiflorum*, yellow, spring, N.W. America; *Heleneae*, white, yellow base, Aug., 9 in., California; *Hendersonii*, purple-rose, March, 6 in., Oregon; *Howellii*, yellow and orange, spring, 6 in., Oregon; *multicapoidium* (syn. *E. Hartwegii*), white to pale yellow, 6 in., California; *oregonum* (syn. *E. giganteum* hort.), white, yellow base, 6 to 18 in., Oregon to Br. Columbia; *purpurascens*, yellow, purple, and orange, spring, California; *revolutum*, rose-pink, spring, 8 to 12 in., California, and vars. *albiflorum* (syn. *E. Watsonii*), white and maroon, and *Johnsonii*, rosy pink; *tuolumnense*, deep, golden yellow, April, 9 to 12 in., California.

Escallonia—*Saxifragaceae* (or *Escalloniaceae*). Slightly tender evergreen or deciduous shrubs. First introduced early nineteenth century.

CULTURE: Soil, ordinary, rich, well drained. Position, against south walls in Midlands and in open garden S. of England. May also be planted against back walls of cold greenhouses. Suitable for hedges in mild districts and are excellent maritime shrubs. Plant, Oct. or April. Prune straggly shoots only in April. The named hybrids available are generally more reliable than the species.

PROPAGATION: By seeds; cuttings inserted in sandy soil under bell-glass Aug. or Sept.; layering shoots in Oct.; suckers removed and replanted in April.

EVERGREEN SPECIES CULTIVATED: *E. exoniensis*, white or rose-tinted, June to Oct., 15 to 20 ft., hybrid; *floribunda*, white, late summer and autumn, 10 ft., S. America; *illinita*, white, Aug., 10 to 12 ft., Chile; *langleyensis*, rosy carmine, one of the most popular, does well on a north wall, June, 8 ft., hybrid; *macrantha*, crimson-red, June, 6 to 10 ft., Chile; *montevidensis* (syn. *E. floribunda*), white,

July, 10 ft., Montevideo; *organensis*, rosy red, Sept., 4 to 6 ft., Brazil; *ptero-cladon*, white, June to Aug., 4 to 8 ft., Patagonia; *pulverulenta*, white, July to Sept., 10 to 12 ft., Chile; *punctata*, red, July, 6 to 10 ft., Chile; *revoluta*, white, June to Aug., 15 to 20 ft., Chile; *rubra*, red, July to Sept., 6 ft., Chile; *viscosa*, white, June to Aug., 10 ft., Chile.

DECIDUOUS SPECIES CULTIVATED: *E. virgata* var. *Philippiana*, 6 to 8 ft., white, June to July, hardy, Chile.

Eschscholtzia (Californian Poppy)—*Papaveraceae*. Hardy annuals. Sometimes spelled *Eschscholzia*. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, sunny well-drained beds or borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in April where plants are to flower. Thin seedlings out to 2 in. apart when 1 in. high.

SPECIES CULTIVATED: *E. californica*, orange-yellow, summer, 1 to 2 ft., California. Numerous vars. will be found in trade lists.

Esparto Grass, see *Stipa tenacissima*.

Euanthe, see *Vanda Sanderiana*.

Eucalyptus (Gum)—*Myrtaceae*. Greenhouse and slightly tender evergreen trees. Fragrant leaves, mostly ovate-lanceolate. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould, charcoal and sand. Position, pots in greenhouse heated to temp. 45° to 50° in winter, 55° to 60° other times; dwelling rooms, sunny beds outdoors during summer, sheltered positions outdoors all the year S. England. Pot, March or April. Plant, outdoors June, lift October. Water plants in pots moderately Oct. to April, freely afterwards. Pruning not required.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pots of sandy soil in temp. 65° in Feb., March or April; for pot culture young plants should be raised annually.

SPECIES CULTIVATED: *E. amygdalina*, 'Almond-leaved' or 'Peppermint Gum', Australia, and vars. *angustifolia*, *numerosa*, *regnans*, 'Giant Gum'; *coccifera*, Tasmania; *cordata*, Tasmania; *coriacea*, Australia; *globulus*, 'Blue Gum', 15 to 20 ft., Australia; *Gunnii*, 15 to 20 ft., Australia; *maculata*, var. *citriodora*, 'Citron-scented Gum', 15 to 20 ft., Australia; *resinifera*, 30 to 60 ft., Australia; *viminalis*, 'Manna Gum', Australia.

Eucharidium, see *Clarkia*.

Eucharis—*Amaryllidaceae*. Stove, bulbous, flowering, evergreen plants. First introduced mid-nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part peat, decomposed sheep manure and sand. Position, well-drained pots on a bed or stage heated beneath to temp. 85° in plant stove. Pot in June or July, placing six bulbs in a 10 in. pot. Press down compost firmly. Repotting not needed more often than once every three or four years. Water moderately Oct. to April, freely afterwards. Syringe freely in summer. Apply liquid manure twice a week after flower stems appear. Top-dress established plants annually in March with rich compost. Temp., March to Sept. 70° to 80°, Sept. to Dec. 55° to 65°, Dec. to March 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in temp. 85° in Feb. or March; offsets removed from old bulbs and placed singly in 3 in. pots in June or July.

SPECIES CULTIVATED: *E. candida*, white, autumn, 1 ft., Colombia; *grandiflora* (syn. *E. amazonica*), 'Amazon Lily', white, March to Dec., 1 to 2 ft., Colombia; *Lowii*, white, spring, 1 to 2 ft., hybrid; *Mastersii*, white, spring, 12 to 18 in., Colombia; *Sanderiana*, white and yellow, spring, 12 to 18 in., Colombia; *Stevensii*, white and yellow, spring, 1 ft., hybrid; *subdentata*, Colombia.

Eucomis—*Liliaceae*. Half-hardy bulbous flowering plants. First introduced mid-eighteenth century.

POT CULTURE: Compost, two parts sandy loam, one part well-decayed manure

and sand. Position, well-drained pots in light, warm greenhouse. Pot, Oct. or March, placing one bulb in a 5 in. pot. Water very little Sept. to March, moderately March to May, freely afterwards. Temp., Sept. to March 45° to 50°, March to Sept. 55° to 65°. Apply liquid manure occasionally when flower spike shows.

OUTDOOR CULTURE: Soil, ordinary, light, rich. Position, sunny well-drained border. Plant, Sept., Oct. or March, placing bulbs 6 in. below surface and 6 in. apart. Protect in winter by covering of ashes, coconut-fibre refuse or manure.

PROPAGATION: By offsets removed and transplanted in Sept. or Oct.

SPECIES CULTIVATED: *E. bicolor*, greenish-yellow, Aug., 1 to 2 ft., Natal; *comosa* (syn. *E. punctata*), 'Pineapple Flower', green and brown, Aug., 18 in. to 2 ft.; *pallidiflora*, greenish-white, 2 ft., S. Africa; *regia*, 'King's Flower', green and purple, 2 ft., S. Africa.

Eucryphia—*Eucryphiaceae*. Hardy and slightly tender evergreen and deciduous flowering trees of great beauty.

CULTURE: Soil, ordinary, light, with plenty of peat or leaf-mould. Position, warm open shrubberies with preferably some shade for roots. *E. cordifolia* will grow on chalky soils.

PROPAGATION: Layers in autumn, or seed sown in peaty soil in spring.

SPECIES CULTIVATED: *E. cordifolia*, evergreen, 10 to 15 ft., Sept. to Oct., white flowers, requires warm locality, Chile; *glutinosa* (syn. *E. pinnatifolia*), partially deciduous, 12 to 18 ft., July to Aug., white, hardy, Chile; *nymansensis*, a vigorous hybrid between the two species, evergreen, July to Sept., white, hardy.

Eugenia (Fruiting Myrtle)—*Myrtaceae*. Stove and greenhouse flowering evergreen shrubs. The dried flower buds of *E. aromatica* provide the cloves of commerce. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Pot, Feb. or March. Position, pots in stove or greenhouse. Water moderately Oct. to April, freely afterwards. Syringe April to Aug. Prune straggling shoots in March. Temp. for stove species, 55° to 65° Sept. to March, 65° to 75° March to Sept.; for greenhouse species, 40° to 50° Oct. to March, 55° to 65° March to Oct.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil under bell-glass in temp. 55° to 75° in summer.

STOVE SPECIES CULTIVATED: *E. aromatica*, 'Clove Tree', 20 ft., Moluccas; *Jambos*, 'Rose Apple', white, summer, 20 ft., Trop. Asia; *malaccensis*, 'Malay Apple', scarlet, summer, 15 to 20 ft., Malaya. See also Myrtus.

GREENHOUSE SPECIES CULTIVATED: *E. apiculata* (syn. *Myrtus Luma*), white, freely borne, summer, cinnamon-coloured branches, 20 ft., Chile; *myriophylla*, leaves narrow and elegant, 6 ft., Brazil.

Eulalia, see Miscanthus.

Eulophia—*Orchidaceae*. A large genus of epiphytal or semi-epiphytal and terrestrial orchids; widely distributed. Few are of sufficient interest to warrant their cultivation.

CULTURE: Usually pseudo-bulbs are present and the spikes produced from their bases; a decided rest should be given to hard-bulbed and hard-leaved species. A winter temp. of 60° is sufficient for such species. Around 70° for species from tropical Africa and Madagascar. All revel in a tropical atmosphere in summer. Compost, two parts osmunda fibre, two parts fibrous loam, one part sphagnum. Well-drained pots are suitable.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *E. epidendroides* (syn. *E. virens*), whitish, violet-crested, spring, Ceylon, India; *guineensis*, purplish, green, lip whitish, flushed crimson, summer, autumn, W. Africa, var. *purpurata*, rose; *lurida*, small, yellowish-brown, autumn, W. Africa; *nuda*, greenish, lilac, yellow, rose, spring, India, China; *Saundersiana*, yellowish, green, marked black-purple, spring, Africa. Many other species but few in orchid collections.

Eulophiella—*Orchidaceae*. Only three species are known in this epiphytic genus. Spikes from base of pseudo-bulbs. Flowers fleshy, beautiful.

CULTURE: Compost, two parts of osmunda fibre, one part of crushed potsherds and sphagnum moss. A warm moist atmosphere is required throughout the year. Compost must not get dry, nor waterlogged in winter; temp. 70°, higher in summer, with shading.

PROPAGATION: By division of plants. The rhizome may be cut, behind at least four pseudo-bulbs, and growths may develop.

SPECIES CULTIVATED: *E. Elizabethiae*, many, white, rose-flushed, purplish, lip with golden disk, spring, summer, basket, Madagascar; *Pectersiana* (syn. *E. Roemplerianum*), violet, purplish-rose, lip paler, centrally, disk orange-yellow, spring, summer, raft, Madagascar; *Rolfei*, a beautiful hybrid between the above species.

Euonymus (Spindle-tree)—*Celastraceae*. Hardy and slightly tender deciduous and evergreen shrubs. Leaves mostly oval-shaped, green, or variegated with white and yellow, in the evergreen kinds; the deciduous ones being grown for the great beauty of their autumn fruits.

CULTURE: Soil, ordinary. Position, deciduous species in shrubberies; evergreen species against south or west walls, edgings to beds, window boxes, hedges and front of shrubberies. Plant deciduous species in Sept., Oct. or Nov.; evergreen in Sept., Oct., March or April. Prune, Oct. or April. Good seaside shrubs.

POT CULTURE OF EVERGREEN SPECIES: Compost, two parts loam, one part leaf-mould and sand. Position, well-drained pots in cool greenhouse, corridors, balconies, windows. Pot, Sept., Oct. or March. Water moderately in winter, freely other times. Syringe foliage frequently in summer.

PROPAGATION: By cuttings of shoots of current year's growth, well ripened, inserted in sandy soil in cool greenhouse, window or frame, in Sept. or Oct.; *E. radicans* by division at planting time. Deciduous kinds from seed sown in spring.

DECIDUOUS SPECIES CULTIVATED: *E. alatus*, 6 to 8 ft., China and Japan; *europaeus*, 10 to 15 ft., Europe (Br.) and Siberia, 'Common Spindle-tree', well known for its brilliant red and orange autumn fruits, with vars. *atropurpureus*, coloured foliage, *fructu-albo* and *fructu-coccineo*, white and scarlet fruits respectively; *latifolius*, 10 ft., a fine European species with large fruits; *sachalinensis* (syn. *E. planipes*), 10 ft., very similar to *E. latifolius*, Japan; *yedoensis*, 15 ft., fruit pink, Japan.

EVERGREEN SPECIES CULTIVATED: *E. japonicus*, leaves green, 4 to 6 ft., China and Japan, and vars. *albo-marginatus*, leaves margined with white, *aureus*, leaves yellow, *albo-variegatus*, leaves broad and variegated with white; *radicans*, 1 ft., Japan, and its silver- and golden-leaved forms.

Eupatorium—*Compositae*. Hardy and slightly tender herbaceous and greenhouse shrubby plants.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts loam and dried cow manure with a little sand. Position, pots in light greenhouse Sept. to June, cold frame June to Sept. Pot, March to April. Prune immediately after flowering. Water moderately Sept. to March, freely afterwards. Temp., Sept. to March 45° to 50°, March to June 55° to 60°. Apply liquid manure frequently to plants in flower. May be planted out in the open garden in June, the shoots should be frequently pinched. Lift and repot for flowering in greenhouse.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, in open borders or shrubberies. Plant, Oct., Nov., March or April.

PROPAGATION: By cuttings of young shoots in sandy soil in temp. 55° to 65° in March or April. Hardy species by division in Oct. or March.

GREENHOUSE SPECIES CULTIVATED: *E. atropurpureus*, red, Jan. to March, 12 to 18 in., Mexico; *ligustrinum* (syn. *E. micranthum*, *E. Weinmannianum*), white, autumn, 8 ft., Mexico; *riparium*, white, spring, 2 to 3 ft., Mexico; *sordidum* (syn. *E. ianthinum*), purple, winter, 2 ft., Mexico.

HARDY SPECIES CULTIVATED: *E. cannabinum*, 'Hemp Agrimony', reddish-purple, July, 2 to 4 ft., Britain; *purpureum*, 'Joe-Pye Weed', purplish, autumn,

3 to 6 ft., N. America; *rugosum* (syn. *E. ageratoides*), white, summer, 2 to 4 ft., N. America.

Euphorbia (Spurge)—*Euphorbiaceae*. Stove and hardy flowering shrubs or herbs.

CULTURE OF WARM HOUSE SPECIES: Compost, equal parts fibrous loam and peat with liberal amount of sand. Position, sunny dry part of stove, with shoots trained up roof, wall, or on trellis. Pot, March or June. Water moderately Sept. to Jan.; keep almost dry Jan. to May, freely afterwards. Temp., Jan. to May 50° to 55°, May to Sept. 65° to 75°, Sept. to Jan. 55° to 65°. Prune *E. fulgens* in June, cutting shoots back to within 1 in. of base.

CULTURE OF POINSETTIA: Flowers, insignificant. Bracts, scarlet, white; winter. Foliage, green or variegated with creamy-white. Compost, four parts fibrous loam, one part decayed cow manure, and half a part silver sand. Position, pots or beds with shoots trained to back wall of stove. **YOUNG PLANTS:** Place old plants in temp. 65° to 75° in May. Remove young shoots when 2 to 3 in. long, insert singly in 2 in. pots filled with sandy loam and peat, and plunge to the rims in bottom heat of 85°, under a bell-glass or in propagator. When rooted, place singly in 4 in. pots, plunge again in bottom heat for a few days, then remove to shelf near glass. As soon as well rooted, transfer to 6 or 8 in. pots, keep near glass for week or so, then gradually harden. Place in cold sunny frame until Sept., when remove to temp. 55°. Shade from midday sun when in cold frame. Water freely. Syringe twice daily. Ventilate freely on fine days. Transfer plants into temp. 60° to 65° end of Sept. Water moderately. Apply stimulants twice a week. After flowering remove to a temp. of 40° to 45°, keep roots quite dry and store pots on their side under staging. **OLD PLANTS:** Prune shoots, unless required for producing cuttings, to second latent bud or eye from their base, end of April. When new shoots are 1 in. long, turn plants out of their pots, remove old soil from roots, cut off the straggling ends of latter, and repot in pots just large enough to take roots and little compost. Place in temp. 65° to 75° from pruning time. Repot into larger size when small pots are filled with roots. Place in cold sunny frame or pit during July and Aug. Water and syringe freely. Remove to temp. 55° to 60°, Sept., 60° to 70°, Oct. onwards. Apply stimulants twice a week Oct., until bracts are fully developed, then cease. After flowering treat as advised for young plants. **Beds:** Compost, as above. Plant, July. Train the shoots thinly to wall. Water freely while growing; after flowering keep quite dry. Prune shoots to within one latent bud of their base, end of Sept. Temp., April to Sept. 65° to 75°, Sept. to April 55° to 60°. Average height of a well-grown young plant 12 to 18 in. Average diameter of a well-grown head of bracts 10 to 15 in.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, dry borders, banks, sunny rockeries. Plant, March or April.

PROPAGATION: Stove species by cuttings of young shoots 3 in. long inserted in well-drained pots of sandy compost in temp. 70° in May, June or July; hardy species by cuttings inserted in sandy soil in cold frame in summer, seeds sown in dryish positions outdoors in April, division of plants in Oct. or April.

STOVE SPECIES CULTIVATED: *E. fulgens* (syn. *E. jacquinaeflora*), scarlet, autumn and winter, 2 to 3 ft., Mexico; *Milii* (syn. *E. splendens*), red, summer, 4 ft., Madagascar; *pulcherrima* (syn. *Poinsettia pulcherrima*), 'Poinsettia', scarlet, autumn, 3 to 6 ft., Mexico.

HARDY SPECIES CULTIVATED: *E. amygdaloides*, yellow, late summer, Europe and Orient; *Cyparissias*, 'Cypress Spurge', yellow, June, 2 ft., Europe; *epithymoides*, soft yellow, early spring, 9 in., Europe; *Lathyrus*, 'Caper Spurge', yellow, June and July, 3 to 4 ft., biennial, Europe; *Myrsinites*, yellow, summer, trailing, S. Europe; *pilosa major*, yellow, spring, 1 to 1½ ft., Europe, N. Asia; *polychroma*, yellow, spring, 12 in., Europe; *sikkimensis*, yellow, 2 ft., E. Himalaya; *Wulfenii* yellow, summer, 3 ft., Europe.

Eupritchardia—*Palmae*. Warm greenhouse fan palms. First introduced late nineteenth century.

CULTURE: Compost, two parts peat and one part of loam and sand. Position,

well-drained pots in light part of stove. Pot, Feb. to April. Water moderately Oct. to March, freely afterwards. Syringe twice daily March to Sept., once daily Sept. to March. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in light, rich soil in temp. 80° to 90° Feb., March or April.

SPECIES CULTIVATED: *E. Martii*, 4 to 10 ft., Sandwich Islands; *pacifica*, 20 to 30 ft., Fiji; *Thurstonii*, 4 to 10 ft., Fiji.

European Palm, see *Chamaerops humilis*.

Eurya—*Theaceae* (or *Ternstroemiaceae*). Slightly tender evergreen shrubs.

CULTURE: Compost, two parts loam, one part peat and sand. Position, pots in cool greenhouse, dwelling-rooms or windows. Pot, March or April. Water moderately in winter, freely other times. *E. japonica* may be grown outdoors in S. of England and Ireland. Requires protection when young.

PROPAGATION: By cuttings of young shoots inserted in sandy soil in temp. 60° to 65° in spring.

SPECIES CULTIVATED: *E. japonica*, 5 ft., India, China and Japan, var. *variegata*, leaves green and creamy-white. For *E. ochracea*, see *Cleyera*.

Eurycles—*Amaryllidaceae*. Stove bulbous plants. First introduced mid-eighteenth century.

CULTURE: Compost, three parts sandy loam, one part leaf-mould and sand. Position, well-drained pots in light part of stove. Pot, Feb. Water freely March to Sept., keep nearly dry remainder of time. Temp. for stove species, Sept. to March 50° to 55°, March to Sept. 65° to 75°.

PROPAGATION: By offsets removed and placed singly in small pots in Feb.

SPECIES CULTIVATED: *E. Cunninghamii*, 'Brisbane Lily', white, July, 1 ft., Australia; *sylvestris*, white, spring, 1 to 1½ ft., Malaya and Australia.

Euterpe—*Palmae*. Stove ornamental-leaved palms. First introduced mid-seventeenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould and sand. Pot, Feb. to March. Position, pots in shady part of stove. Water freely always. Shade from sun. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 65°.

PROPAGATION: By seeds sown 1 in. deep in above compost, in temp. 85° in spring.

SPECIES CULTIVATED: *E. edulis*, 10 to 20 ft., Trop. America; *oleracea*, 10 to 20 ft., Brazil.

Evening Primrose, see *Oenothera biennis*.

Evergreen Candytuft, see *Iberis sempervirens*; -**Oak**, see *Quercus Ilex*.

Everlasting Flowers, see *Ammobium*, *Anaphalis*, *Antennaria*, *Helipterum*, *Helichrysum*, *Limonium* and *Xeranthemum*; -**Pea**, see *Lathyrus latifolius*.

Exacum—*Gentianaceae*. Stove annuals and perennials. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Position, pots in light part of plant stove. Water freely. Temp., 65° to 75°.

PROPAGATION: By seeds sown on surface of fine compost in temp. 75° to 80° in April, transplanting seedlings when large enough to handle into small pots and thence into a larger size later on; perennial species also by cuttings.

PERENNIAL SPECIES CULTIVATED: *E. affine*, bluish-lilac, fragrant, June to Oct., 6 in., Socotra.

BIENNIAL SPECIES CULTIVATED: *E. macranthum*, purplish-blue, 2 ft., Ceylon; *zeylanicum*, violet-purple, autumn, 2 ft., Ceylon.

Exochorda (Pearl Bush)—*Rosaceae*. Hardy deciduous flowering shrubs of great beauty, somewhat neglected in gardens. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, shrubberies, full sun, but not too dry. Plant, Oct. to Feb. Prune after flowering.

PROPAGATION: By seeds sown in sandy soil in cold frame in spring or autumn; cuttings of young shoots inserted in sandy soil under bell-glass in summer.

SPECIES CULTIVATED: *E. Giraldui*, white, May, 10 ft., N. and W. China, and var. *Wilsonii* with very large flowers; *Korolkowii* (syn. *E. Albertii*), white, May, 12 ft., probably the best species, grows well in chalk, Turkistan; *macrantha*, hybrid between *E. racemosa* and *E. Korolkowii*, 15 ft., vigorous upright habit, white, April, May; *racemosa* (syn. *E. grandiflora*), white, May, 10 ft., very free flowering, N. China.

Fabiana (False Heath)—*Solanaceae*. Rather tender flowering evergreen shrubs with heath-like foliage and flowers. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, protected by south or west walls; cool greenhouses N. of England. Plant, Oct. or April. Water plants in pots moderately in winter, freely in summer. Repot, March or April.

PROPAGATION: By cuttings of firm young shoots inserted in sandy soil under bell-glass in cold greenhouse, or in cold frame in March or April.

SPECIES CULTIVATED: *F. imbricata*, white, May, only hardy in the south, or sheltered positions elsewhere, to 8 ft., Chile, vars. *prostrata*, a fairly hardy form for the rockery, and *violacea*, newer form, more hardy than the type.

Fagopyrum—*Polygonaceae*. Hardy annual. Grown for seed for pheasant and poultry feeding; also for ploughing or digging in as a green manure. Good bee plant.

CULTURE: Soil, light, sandy or well drained; clay unsuitable. Sow in May in shallow drills 6 in. to 8 in. apart. Harvest when greatest amount of seed has matured, as seeds do not ripen all at once. Cut early in morning when moist with dew. Dig in as green manure when flowering begins.

SPECIES CULTIVATED: *F. esculentum*, 'Buckwheat', pink and white, summer, 3 ft., Cent. Asia.

Fagus (Beech)—*Fagaceae*. Hardy deciduous trees.

CULTURE: Soil, sandy or chalky, and gravelly loam. Position, open dryish shrubberies, lawns, copses; also good seaside tree. Plant, Oct. to Feb. Common species (*F. sylvatica*) is a good hedge shrub; plant 9 in. apart and keep sides closely trimmed. Timber used for making joiners' tools, gun stocks, saddle trees and wheel felloes.

PROPAGATION: By seeds sown 1 in. deep in rows 15 in. apart in March or April, transplanting seedlings when two years old; variegated kinds by grafting in March on common species.

SPECIES CULTIVATED: *F. sylvatica*, 'Common Beech', 70 to 80 ft., deciduous, Europe (Br.), and vars. *atropunicea*, 'Copper Beech', *laciniata*, 'Cutleaf Beech', *pendula*, 'Weeping Beech', *purpurea*, 'Purple Beech'.

Fair Maids of February, see *Galanthus nivalis*; -of France, -of Kent, see *Ranunculus aconitifolius*.

Fairy Moss, see *Azolla*.

False Aralia, see *Dizygotheca*; -**Acacia**, see *Robinia*; -**Dragonshead**, see *Physostegia*; -**Hellebore**, see *Veratrum*; -**Indigo**, see *Baptisia*; -**Mitrewort**, see *Tiarella cordifolia*; -**Plantain**, see *Heliconia Bihai*; -**Solomon's Seal**, see *Smilacina*; -**Spiraea**, see *Sorbaria*; -**Tamarisk**, see *Myricaria*.

Farewell-to-Spring, see *Godetia amoena*.

Fatsia—*Araliaceae*. Hardy or slightly tender evergreen shrub. A popular room or greenhouse plant. First introduced early nineteenth century.

GREENHOUSE CULTURE: Compost, two parts sandy loam, one part leaf-mould, decayed manure and sand. Position, well-drained pots in cool greenhouse or dwelling room. Pot or plant, Feb. to April. Water moderately Sept. to April freely afterwards. Temp., Sept. to April 40° to 50°, April to Sept. 55° to 65°.

OUTDOOR CULTURE: Soil, ordinary, well drained. Position, sheltered, partially-shaded shrubberies, requires protection in severe weather. Plant, May.

PROPAGATION: By cuttings of roots in light soil in temp. 80° in March or April; variegated kinds by grafting on common species in temp. 75° in March or April, tall plants by stem-rooting in spring.

SPECIES CULTIVATED: *F. japonica* (syn. *Aralia Sieboldii*, *A. japonica*), 'Japanese Aralia' or 'Figleaf Palm', leaves green, palmate, 6 to 15 ft., Japan, and variegated vars.

Faucaria—Aizoaceae. Greenhouse succulent plants.

CULTURE: Compost, six parts sharp sand, three parts rich loam, two parts leaf-mould, one part each mortar rubble and crushed brick. Position, well-drained pots in sunny greenhouse or window, or bed on greenhouse staging. Plant or pot, May. Water freely in autumn and winter, less freely spring and summer. Temp., Oct. to Mar. 45° to 55°, April to Sept. 55° and over.

PROPAGATION: By seeds sown in close atmosphere, temp. 55° to 60°, April or Sept.; stem cuttings, which should first be dried, May or June, temp. 60°.

SPECIES CULTIVATED: *F. albidens*, yellow, Aug. to Nov., S. Africa; *Britteniae*, yellow, Aug. to Nov., S. Africa; *felina* (syn. *Mesembryanthemum felinum*), yellow, Aug. to Nov., S. Africa; *lupina* (syn. *M. lupinum*), yellow, Aug. to Nov., S. Africa; *tigrina* (syn. *M. tigrinum*), yellow, Aug. to Nov., S. Africa; *tuberculosa* (syn. *M. tuberosum*), yellow, Aug. to Nov., S. Africa.

Fauria—Gentianaceae (or Menyanthaceae). Hardy aquatic perennial, allied to *Menyanthes*.

CULTURE: Soil, ordinary mud or bog. Position, shallow stream pools, ponds, marshes, bogs.

PROPAGATION: By inserting pieces of creeping stem in the mud, March to Oct.

SPECIES CULTIVATED: *F. Crista-galli* (syn. *Menyanthes Crista-galli*, *Nephtopyllidium Crista-galli*), white, 1 to 2 ft., N. America to Alaska.

Feather Grass, see *Stipa*; **-Hyacinth**, see *Muscari comosum* var. *monstrosum*.

Feathery Bamboo, see *Bambusa vulgaris*.

Fedia—Valerianaceae. Hardy annual. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, open beds, rockeries or borders.

PROPAGATION: By seeds sown in boxes or pots of light soil in temp. 55° in March, transplanting into borders in May; or outdoors in April where plants are to grow.

SPECIES CULTIVATED: *F. Cornucopiae*, 'Horn of Plenty', red, lilac, rose, and carmine, July, 6 to 12 in., S. Europe.

Feijoa—Myrtaceae. Half-hardy evergreen flowering tree. First introduced late nineteenth century.

CULTURE: Compost, equal parts sandy loam and leaf-mould with a liberal addition of well-decayed manure. Position, well-drained pots in cool greenhouse, outdoors on south wall, or sheltered shrubberies in mild districts. Water freely during growing season.

PROPAGATION: By seeds sown in sandy soil during Feb. or March in temp. 55° to 60°; cuttings of young growth during June or July under bell-glass in gentle bottom heat.

SPECIES CULTIVATED: *F. Sellowiana*, white and purplish, autumn, to 18 ft., S. America.

Felicia—Compositae. Half-hardy annuals or biennials and sub-shrubs.

CULTURE: Soil, ordinary. Position, sunny beds or borders, or sunny greenhouse. Sow seeds thinly in well-drained pans during Feb. or March in temp. 55° to 60°. Prick out when large enough to handle and harden off for planting out in May. Shrubby species by cuttings of young shoots March or Aug. in sandy soil, temp. 55° to 65°.

SPECIES CULTIVATED: *F. amelloides* (syn. *Agathaea coelestis*), 'Blue Marguerite',

blue, June to Aug., 12 to 18 in., sub-shrub, S. Africa; *Bergeriana*, blue, dwarf, summer, annual, S. Africa; *petiolata*, rose to blue, summer, prostrate sub-shrub, S. Africa; *tenella* (syn. *F. fragilis*), pale blue, summer, 12 to 14 in., annual, S. Africa.

Fendlera—*Saxifragaceae* (or *Hydrangeaceae*). Slightly tender deciduous flowering shrub; does not succeed well in this climate. First introduced late nineteenth century.

CULTURE: Soil, sandy loam. Position, sunny rockeries or against S. or S.W. walls. Plant, Nov. to Feb.

PROPAGATION: By cuttings of young growth during June or July under bell-glass in gentle bottom heat.

SPECIES CULTIVATED: *F. rupicola*, white or rose-tinted, May to June, 3 to 6 ft., S.W. United States.

Fennel, see *Foeniculum vulgare*; **-Flower**, see *Nigella*.

Fenugreek, see *Trigonella Foenum-Graecum*.

Ferocactus (Hedgehog Cactus)—*Cactaceae*. Greenhouse succulent plants, formerly included in the genus *Echinocactus*.

CULTURE: Compost, two parts fibrous sandy loam, one part brick rubble, old mortar rubble and sharp sand. Position, well-drained pots or pans in sunny greenhouse or window. Repot every two or three years in spring. Water only occasionally Sept. to April, once a week afterwards. Temp., Sept. to March 50° to 55°, March to Sept. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots or pans of sandy soil in temp. 75° in spring, keeping soil moderately moist; cuttings of stems inserted in small pots of sandy soil kept barely moist in summer; grafting on common kinds in April.

SPECIES CULTIVATED: *F. acanthodes* (syn. *F. Lecontei*), lemon-yellow, summer, Mexico; *cylindraceus*, yellow, summer, Colorado; *latispinus* (syn. *F. cornigera*), purple, summer, Mexico.

Ferraria (Black Iris)—*Iridaceae*. Half-hardy deciduous bulbous plant. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part peat. Position, cool greenhouse. Pot, Nov. Place bulbs with point just below surface and 1 to 2 in. apart. Water occasionally Nov. to Feb; moderately Feb. to June; keep quite dry July to Nov. Temp., Nov. to Feb. 40° to 45°, Feb. to June, 50° to 60°.

SPECIES CULTIVATED: *F. antherosa*, green and brown, June, 6 in., S. Africa; *undulata*, brown and purple, March and April, 6 to 8 in., S. Africa.

Ferula—*Umbelliferae*. Hardy herbaceous plants with elegant, fern-like, deep green foliage. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, open, margins of shrubberies, borders, ponds, isolated on lawns and summits of rockeries or banks. Plant, Nov. to March.

PROPAGATION: By seeds sown in Sept. or Nov. in light soil outdoors, transplanting seedlings following summer; division of roots in Oct. or Nov.

SPECIES CULTIVATED: *F. communis*, 'Giant Fennel', yellow, June, 8 to 12 ft., Medit. Region, var. *glauca*, yellow; *tingitana*, yellow, June, 6 to 8 ft., N. Africa.

Fescue, see *Festuca*.

Festuca—*Gramineae*. Hardy perennial grass.

OUTDOOR CULTURE: Soil, ordinary. Position, edgings of flower beds or borders. Plant, Sept., Oct., March or April.

POT CULTURE: Compost, two parts good soil, one part leaf-mould and sand. Position, cold or warm greenhouses and windows. Pot, March or April. Water moderately in winter, freely other times.

PROPAGATION: By seeds sown outdoors in April; division in March or April.

SPECIES CULTIVATED: *F. ovina glauca*, 'Fescue Grass', leaves bristly, glaucous green, 6 in., Britain.

Feverfew, see *Chrysanthemum Parthenium*.

Ficus (Fig)—*Moraceae*. Stove, greenhouse and hardy deciduous and evergreen trees and shrubs. Flowers unisexual, borne inside the fruit. *F. Carica* bears the edible fruit of commerce.

CULTURE OF TENDER SPECIES: Compost, three parts loam, one part peat and sand. Position, erect species (*F. elastica*, etc.) in pots in stove, greenhouse or dwelling rooms; creeping species (*F. pumila*) in beds with shoots clinging to walls, rockeries, etc. Pot or plant, Feb., March or April. Water moderately Oct. to March, freely afterwards. Syringe stove species daily Feb. to Aug. Temp. for stove species, 55° to 65° Oct. to Feb., 75° to 85° Feb. to Oct.; for greenhouse species, 50° to 55° Sept. to March, 60° to 70° March to Sept.

CULTURE OF INDIARUBBER PLANT IN ROOMS: Compost, see above. Position, light, near window, away from draughts. Pot, March or April. Water once a week Nov. to March, twice and three times weekly other times. Temp., Sept. to April 40° to 50°, April to Sept. 55° to 60°. Sponge leaves weekly.

OUTDOOR CULTURE IN SUMMER: Plunge pots to rim in sunny beds middle of June. Lift and place in greenhouse again in Sept. Water freely daily.

OUTDOOR CULTURE OF FIG: Compost, two parts fibrous loam, one part brick rubbish and old mortar. Position, against south or south-west walls. Plant, April, in border 2 ft. deep and 3 ft. wide, enclosed with brick or concrete wall. Mode of bearing: Entire length of previous year's shoots; only one crop borne outdoors in England. Prune, April or July, simply removing deformed, dead, or very weak branches. Pinch points off vigorous young shoots in July. Apply liquid manure once in Aug. to trees bearing heavily. Figlets size of filberts remove in Sept. or Oct. Protect branches in Dec. with straw or mats, removing both in April.

CULTURE OF FIG UNDER GLASS: Compost, position, border, time of planting as above. Branches trained up roof or against wall. Mode of bearing: On shoots of previous year's growth for first crop; those of current year for second crop. Prune and pinch as above. Disbud young shoots when too many are forming. Water and syringe freely in summer. Apply liquid manure occasionally in summer. Temp. for forcing, 50° to 65°.

POT CULTURE OF FIG: Compost, turfy loam, little bonemeal. Position, ordinary greenhouse, vinery or forcing house. Pot, Nov. to April. Size of pots, 10 or 12 in. Water freely when growing, very little when not. Apply liquid manure twice weekly to trees bearing fruit. Syringe daily when in growth. Pinch points off young shoots when latter are 9 in. long. Protect pots with covering of straw Nov. to Jan. and partially expose branches to the air.

PROPAGATION: Tender species by cuttings of shoots inserted in sandy peat in a temp. of 75° in spring or summer; cuttings of stem 1 in. long, and with one leaf attached, slightly burying stem portion in soil and supporting leaf with a stake, and placing in above temp.; stem rooting in case of tall india-rubber plants in spring. Expose cuttings to air for a short time to allow base to dry before inserting in soil. Fig by seeds sown in light soil in a temp. of 65° to 70° in Jan., afterwards growing seedlings on in pots until they bear fruit and it can be seen if they are worth growing; cuttings of previous year's shoots 6 in. long and having a heel of older wood attached at base, inserted in a warm border outdoors or in pots in gentle heat between Oct. and March; cuttings of young shoots, 3 or 4 in. long, removed with a heel of older wood, and inserted in pots of light sandy soil in a propagating frame (temp. 70°) in June; layering shoots in summer; grafting by approach just after tree comes into leaf; budding in July; suckers in autumn.

TENDER SPECIES CULTIVATED: *F. benghalensis*, 'Banyan Tree', fruits round, red, 30 to 40 ft., India; *Cannonii*, leaves bronzy-red, Society Islands; *Chauvieri*, leaves green and yellow, origin unknown; *diversifolia*, leaves bright green, Malaya; *elastica*, 'India-rubber Plant', leaves green, India, var. *variegata*, leaves variegated; *lyrata* (syn. *F. pandurata*) leaves fiddle-shaped, green, Tropical Africa; *macrophylla*, 'Morton Bay Fig', leaves green, Australia; *Parcellii*, leaves green and white, Polynesia; *pumila* (syn. *F. repens*), leaves green, shoots creeping,

a good plant for covering walls, Japan, var. *minima*, smaller; *radicans variegata*, leaves variegated with silver; *rubiginosa* (syn. *F. australis*), leaves with a rusty appearance underneath, Australia, and var. *variegata*.

HARDY SPECIES CULTIVATED: *F. carica*, 'Fig', Medit. Region; introduced mid-sixteenth century.

Field Balm see *Glechoma hederacea*.

Fig Marigold, see (*Mesembryanthemum*); **-Tree**, see *Ficus*.

Filbert, see *Corylus maxima*.

Filipendula (Meadowsweet)—*Rosaceae*. Hardy herbaceous perennials, formerly included in *Spiraea*.

CULTURE: Soil, ordinary, well manured for *F. Ulmaria*. Position, open sunny borders and wild gardens. Plant, Oct. to Nov., or March to April.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *F. camtschatica* (syns. *Spiraea camtschatica*, *F. kamtschatica*), white, June, 6 to 8 ft., Manchuria, Kamtchatka; *hexapetala* (syns. *Spiraea* and *Ulmaria Filipendula*), 'Dropwort', white, June, 2 to 3 ft., Europe; *palmata* (syn. *Spiraea digitata*), white, 2 to 3 ft., July and Aug., N.E. Asia; *purpurea* (often cultivated as *Spiraea palmata*), pink or purple, 2 to 4 ft., July and Aug., Japan, var. *elegans*, white; *rubra* (syns. *Ulmaria rubra*, *Spiraea lobata*), 'Queen of the Prairie', pink, 4 to 8 ft., N. America, var. *venusta* (syn. *Spiraea venusta*), deep pink, *Ulmaria* (syn. *Spiraea Ulmaria*), 'Common Meadowsweet', white, June, to 6 ft., Europe (incl. Britain), W. Asia, var. *plenum*, double; *vulgaris* (syns. *F. hexapetala*, *Spiraea Filipendula*), 'Dropwort', white, June, 1 to 3 ft., Europe (incl. Britain), var. *plenum*, double.

Finocchio, see *Foeniculum vulgare* var. *dulce*.

Fir, see *Abies*; **-Club Moss**, see *Lycopodium Selago*.

Fire Bush, see *Embothrium coccineum*; **-Pink**, see *Silene virginica*; **-thorn**, see *Pyracantha*; **-weed** see *Epilobium angustifolium*.

Fire-cracker Flower, (*Oichelostemma Ioa-Maia*), see *Brodiaea*.

Fishbone Thistle, see *Cirsium Diacantha*.

Fittonia—*Acanthaceae*. Warm greenhouse, ornamental, perennial, trailing plants with white or coloured veins on the leaves. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Position, shallow pans, pots, or surface of beds in shady part of plant stove. Water moderately Nov. to Feb., freely afterwards. Temp., Oct. to March 55° to 60°, March to Oct. 65° to 75°.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil in temp. 75° to 85° under bell-glass in Feb., March or April; division of plants in Feb. or March.

SPECIES CULTIVATED: *F. gigantea*, leaves green, veined with red, 12 to 15 in., Peru; *Verschaffeltii*, leaves green, veined with red, 8 in., Peru, vars. *argyroneura*, leaves veined white, and *Pearcei*, leaves glaucous below with carmine veins.

Flag, see *Iris germanica*.

Flamboyant, see *Delonix regia*.

Flame Flower, see *Tropaeolum speciosum*.

Flamingo Plant, see *Anthurium*.

Flannel Flower, see *Actinotus Helianthi*; **-Plant**, see *Verbascum Thapsus*.

Flax, see *Linum*.

Fleabane, see *Erigeron*.

Floating Fern, see *Ceratopteris*; **-Heart**, see *Nymphoides*; **-Water Plantain**, see *Luronium*.

Flower-of-an-hour, see *Hibiscus Trionum*; **-of-the-West-Wind**, see *Zephyranthes*.

Flowering Ash, see *Fraxinus Ornus*; **-Currant**, see *Ribes sanguineum*; **-Dogwood**, see *Cornus florida*; **-Moss**, see *Pyxidanthera barbulata*; **-Nutmeg**, see *Leycesteria formosa*; **-Rush**, see *Butomus umbellatus*; **-Seakale**, see *Crambe cordifolia*.

Fly Honeysuckle, see *Lonicera Xylosteum*; **-Orchis**, see *Ophrys muscifera*.

Foam Flower, see *Tiarella cordifolia*.

Foeniculum—*Umbelliferae*. Hardy perennial and annual herbs. Leaves used for sauces and garnishing.

CULTURE: Soil, ordinary. Position, sunny border. Plant *F. vulgare*, March or April, 12 in. apart in rows 15 in. asunder. Sow seeds of *F. dulce* in drills 18 in. apart where plants are required, thinning out seedlings to 6 in. asunder. Remove flower stems as soon as seen, unless seed is wanted.

PROPAGATION: *F. vulgare* by seeds sown $\frac{1}{4}$ in. deep in drills 6 in. apart in March; division of roots in March.

SPECIES CULTIVATED: *F. vulgare*, 'Fennel', yellow, autumn, 2 ft., Europe (Br.), var. *dulce*, 2½ ft., annual, Italy.

Fontanesia—*Oleaceae*. Hardy deciduous shrubs. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, sunny shrubberies, or as hedge plants. Plant, Nov. to Feb.

PROPAGATION: By cuttings inserted in sandy soil in cold frame during late summer.

SPECIES CULTIVATED: *F. Fortunei*, greenish-white, summer, 10 to 15 ft., China; *phillyreoides*, greenish-white, June, 6 to 10 ft., Orient.

Fontinalis (Willow Moss; Water Moss)—*Fontinalaceae*. Hardy aquatic perennials. *F. gracilis* is sometimes considered a variety of *F. antipyretica*.

CULTURE: Usually grows on wood or stone in running water. A piece of this should be detached with the plant and dropped in the pond or aquarium; each portion must be attached separately to a similar material. Plant, spring.

PROPAGATION: By division.

SPECIES CULTIVATED: *F. antipyretica*, Britain; *gracilis*, Europe.

Forget-me-not, see *Myosotis*.

Forsythia (Golden Bells)—*Oleaceae*. Hardy deciduous flowering shrubs. Popular for their early blossoms of yellow and gold. First introduced mid-nineteenth century.

OUTDOOR CULTURE: Soil, ordinary. Position, against south or west walls, or in sheltered parts of shrubbery. Plant, Oct. to Feb. Prune after flowering.

POT CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, well-drained pots in cool or warm greenhouse Dec. to May, outdoors remainder of year. Pot, Oct. to Dec. Water very little till March, then apply freely.

PROPAGATION: By cuttings inserted in sandy soil under bell-glass, July and Aug.; or in cold frame, Oct. or Nov.; layering in Oct. or Nov.

SPECIES CULTIVATED: *F. intermedia*, 10 ft., of upright growth, rich yellow, March to April, a good hybrid but inferior to its var. *spectabilis*, the best of all forsythias, with larger, more numerous, and more richly-coloured flowers, also vars. *densiflora*, free flowering, and *Vitellina*, canary yellow; *ovata suspensa*, 10 ft., as a bush, rather sprawling, and higher when trained to a wall, April, bright yellow, China, var. *atrocaulis*, an excellent form with lemon flowers on purplish stems; *viridissima*, yellow, April, 6 ft., China.

Fortunella (Kumquat)—*Rutaceae*. Small evergreen fruiting shrubs often grown as decorative pot plants. Small orange-like fruits used for preserves and eaten raw. May be hybridised with *Citrus* species.

CULTURE: As Citrus. *F. japonica* makes a good ornamental pot plant, the fruit of which is eaten skin and all.

PROPAGATION: As Citrus.

SPECIES CULTIVATED: *F. japonica* (syn. *Citrus japonica*), 'Round or Marumi Kumquat', sweetly scented, fruit orange $1\frac{1}{4}$ in. round, sweet, foliage glossy, to 10 ft., China; *margarita*, 'Oval or Nagami Kumquat', fruit oblong or oval, to 1 in. diameter, China.

Fothergilla (American Wych-Hazel)—*Hamamelidaceae*. Hardy deciduous flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, well-drained soil, sandy peat. Position, borders. Plant, Oct. to March. Prune after flowering.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in pans of moist sandy peat in temp. of 45° to 55° in March or April; layering shoots in Oct. or Nov.

SPECIES CULTIVATED: *F. Gardenii* (syn. *F. alnifolia*), white, fragrant, May, 3 ft., United States; *major*, pinkish-white and yellow, May, 6 to 8 ft., Virginia and S. Carolina; *monticola*, white and yellow, May, 6 ft., N. America. These species have no petals, colour being provided by the stamens alone; the foliage sometimes colours well in autumn.

Foxglove, see *Digitalis*.

Fragaria (Strawberry)—*Rosaceae*. Low perennial herbs with rooting runners and edible fruits. Virginian strawberry first introduced early in the seventeenth century. The first large-fruited strawberry introduced in England was a seedling of *F. chiloensis* raised by Keens in 1806. Large-fruited varieties now in cultivation are all hybrids. Plants certified as virus-free should always be bought.

CULTURE OF STRAWBERRY: Soil, rich in organic matter and slightly acid, trenched 2 ft. deep. Position, open plots or borders; alpine kinds under shade of trees or on banks. Plant, Aug., Sept. or March, 18 in. apart in rows $2\frac{1}{2}$ ft. asunder; alpines 6 in. apart. Mulch annually with manure or compost in late Feb. and give a light dressing of nitrate of soda after picking. Straw down under the leaves as the fruit begins to swell. Remove runners when they appear. No digging between rows necessary. Renew beds every three or four years.

FORCING: Royal Sovereign is the variety usually used for forcing, and runners are best rooted in early summer into 3 in. pots; when full of roots the pots are lifted and plunged in ashes until ready for potting on in July to 48 size pots towards the side, so that trusses rest on rim. May be potted again to 6 or 7 in. pots in Sept. Compost, equal parts loam and compost or peat, with a little bone-meal plus some dry cow manure for finals. Frames, Oct. to Jan., greenhouse or vineries after Jan. Water moderately till Oct., very little till Jan., freely afterwards. Fertilise blossoms by means of camel-hair brush. Thin fruit when set to a few on each plant. Feed with liquid manure after fruit has set until it begins to ripen. Plant out in garden after fruiting. Temp. for forcing, Jan. to March 45° to 55° , March to ripening period 65° to 75° .

PROPAGATION: By runners on plants from which blossom trusses were removed. Peg runners in 3 in. pots in June or July, or into open ground around plants. Some alpine varieties that do not produce runners, by division or by seeds sown $\frac{1}{16}$ in. deep in light soil outdoors, or in boxes in greenhouse in March or April.

SPECIES CULTIVATED: *F. chiloensis*, parent of large-fruited garden vars, white, May, 8 in., fruit crimson, $\frac{3}{4}$ in., Chile, var. *ananassa*, 'Pine Strawberry'; *moschata* (syn. *F. elatior*), 'Hautbois Strawberry', white, summer, 6 in., fruit red, aroma musky, edible, Europe; *vesca* (syn. *F. alpina*), 'Alpine Strawberry', white, May to Aug., 6 to 12 in., fruit small, scarlet, edible, Europe and N. America; *virginiana*, 'Scarlet Strawberry', white, May, fruit light scarlet, edible, United States—another parent of the many forms of garden strawberries.

Franciscea, see *Brunfelsia*.

Francoa (Maiden's Wreath; Bridal Wreath)—*Saxifragaceae*. Hardy and half-hardy perennial plants. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, light rich loam. Position, sunny sheltered borders, banks, or rockeries. Plant, March or April.

POT CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, well-drained pots in cool greenhouse, frame or window. Pot, March or April. Water moderately Oct. to April, freely afterwards. Apply little liquid manure to plants in flower. Temp., Oct. to April 40° to 50°, April to Sept. 55° to 65°.

PROPAGATION: By seeds sown on the surface of a well-drained pan of sandy peat under bell-glass in temp. of 50° to 55° in Feb., March or April; division of plants at potting time.

SPECIES CULTIVATED: *F. appendiculata*, red, July, 1 to 2 ft., Chile; *ramosa*, white, July and Aug., 2 ft., Chile; *sonchifolia*, pink, summer, 2 ft., Chile.

Frangipani-plant, see *Plumeria*.

Frankenia—*Frankeniaceae*. Hardy evergreen flowering creeping plant.

CULTURE: Soil, light sandy. Position, sunny dry rockeries or borders. Plant, Oct. to April.

PROPAGATION: By division of plants in Oct. or April; seeds in cold frame in April.

SPECIES CULTIVATED: *F. laevis*, rose, July and Aug., Europe (Br.); *pulverulenta*, 'Sea Heath', pink, 2 in., June, Medit.; *thymifolia*, pink, 1 to 2 in., July, Spain, Algiers.

Franklinia—*Theaceae* (or *Ternstroemiaceae*). Rare and beautiful, rather tender, deciduous flowering shrub. Sometimes included in the genus *Gordonia*. First introduced mid-eighteenth century.

CULTURE: Soil, peat and leaf-mould. Position, warm sheltered borders or against a south wall, in mildest southern districts only. Plant in November.

PROPAGATION: By layering shoots in spring.

SPECIES CULTIVATED: *F. alatamaha* (syn. *Gordonia pubescens*), large white camellia-like flowers, fragrant, late summer, 4 to 6 ft., N. America.

Fraxinella, see *Dictamnus albus*.

Fraxinus (Ash)—*Oleaceae*. Hardy deciduous trees. Ornamental foliage and flowering. Flowers, white, green, yellow; March to May.

CULTURE: Soil, ordinary. Position, dryish, sheltered. Suitable for seaside gardens, towns, chalky or gravelly situations. Plant, Oct. to Feb. Prune, Oct. to March. Timber used for tool handles, wooden rakes, ploughs, hoops, dairy utensils, and agricultural implements; also by cabinet makers for furniture making. Average life, 300 years. Timber reaches maturity at 70 years.

PROPAGATION: By seeds stratified and sown the following year; transplant seedlings when a year old; grafting on common species in March.

SPECIES CULTIVATED: *F. americana*, 'White Ash', to 120 ft., Canada; *angustifolia*, 60 to 70 ft., S. Europe and N. Africa; *excelsior*, 'Common Ash', 100 to 140 ft., Europe (Br.), and vars. *crispa*, 'Curl-leaved Ash', *aurea*, 'Golden Ash', *pendula*, 'Weeping Ash'; *floribunda*, white, to 120 ft., Himalaya, slightly tender; *Ornus*, 'Flowering or Manna Ash', 50 to 65 ft., S. Europe; *pennsylvanica*, 40 to 60 ft., Eastern N. America; *Spaethiana*, one of the most striking ashes on account of its yellow-tinged foliage, 30 to 50 ft., Japan; *velutina*, of neat growth yet leafy and suitable for street planting, 30 to 40 ft., S.W. United States; *xanthoxyloides*, 'Afghan Ash', unusual small tree, with winged leaf stalks, Afghanistan.

Freesia—*Iridaceae*. Greenhouse bulbous plants with very fragrant flowers.

INDOOR CULTURE: Compost, equal parts decayed manure, loam, leaf-mould and sand. Position, pots in cool greenhouse, frame or window. Pot, Aug. to flower in Jan., Oct. for Feb., Nov. for March, Dec. for April. Plant bulbs 1 in. deep and 2 in. apart. Suitable sized pot, 4½ in. diameter. Stand pots in cool position and give very little water until growth commences. Water freely when growth well advanced and until plants have flowered, then gradually decrease supply,

keeping soil quite dry till July. Temp., not lower than 40°. Apply weak liquid or artificial manure to plants showing flower. Repot annually.

OUTDOOR CULTURE: Soil, light, rich, sandy. Position, sunny well-drained borders S. of England only. Plant bulbs 2 in. deep and 2 in. apart in Aug. or Sept. Protect in winter.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in pots or pans of light sandy soil in cool greenhouse or frame as soon as ripe, or in March or April; by offsets at potting time. Do not transplant seedlings first year.

SPECIES CULTIVATED: *F. alba* (syn. *F. refracta* var. *alba*), white, to 1½ ft., S. Africa; *Armstrongii*, rosy pink with yellow tube, 10 to 15 in., S. Africa; *corymbosa* (syn. *F. odorata*), yellow and orange, 5 to 18 in., S. Africa; *refracta*, white and orange, May to Aug., 1 ft., S. Africa; *xanthospila*, white with yellow blotch, 6 to 10 in., S. Africa, var. *Leichtlinii*, yellow and orange. There are many hybrids.

Fremontia—*Sterculiaceae*. Slightly tender deciduous flowering shrub. First introduced mid-nineteenth century.

CULTURE: Soil, sandy loam. Position, against west or north walls or fences, or in shrubberies S. of England. Plant, Oct. to March.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in well-drained pots of sandy soil under bell-glass or frame in March or April.

SPECIES CULTIVATED: *F. californica*, golden mallow-like flowers, May to Aug., very handsome, to 10 ft. on a wall, or more in warm localities, California.

French Honeysuckle, see *Hedysarum coronarium*; **-Marigold**, see *Tagetes patula*; **-Mulberry**, see *Callicarpa americana*; **-Rose**, see *Rosa gallica*.

Fringe Tree, see *Chionanthus virginica*.

Fritillaria (Fritillary)—*Liliaceae*. Hardy bulbous plants.

OUTDOOR CULTURE: Soil, ordinary, deep rich. Position, shady borders for Crown Imperial; Snake's-head Fritillary, borders, or naturalised in turf; well-drained open borders for other species. Plant, 4 to 6 in. deep and 6 to 8 in. apart, Sept. to Nov. Top-dress annually with decayed manure. Do not transplant bulbs oftener than once in four years.

POT CULTURE: Compost, equal parts loam, peat, leaf-mould, decayed manure and sand. Position, well-drained pots in cold frame or cold greenhouse. Pot, Sept. or Oct., placing one bulb in centre of 5, 6 or 8 in. pot. Water very little till growth begins, then give moderate supply. Apply liquid manure when plants show flower. After flowering gradually withhold water, keeping soil quite dry after foliage has died.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in pots or pans of sandy soil in cold frame or greenhouse as soon as ripe, or in spring; offsets at planting time. Do not transplant seedlings first year. Seedlings do not flower until four to six years old.

SPECIES CULTIVATED: *F. aurea*, yellow and brown, 6 in., May, Asia Minor; *citrina*, green and yellow, 8 in., May, Asia Minor; *Elwesii*, green and brown, May, 1 ft.; *imperialis*, 'Crown Imperial', yellow, May, 2 to 3 ft., Orient, and vars.; *meleagris*, 'Snake's-head', 'Chequered Daffodil', purple, yellow, and white, May, 12 to 18 in., Europe (Br.), var. *alba*, white; *pallidiflora*, yellow, rose and purple, May, 9 in., Siberia; *persica*, 'Persian Lily', violet blue, May, 2 ft., Asia Minor; *pudica*, golden yellow, April, 6 in., N.W. America; *pyrenaica*, plum, olive, and maroon, summer, 1½ ft., Pyrenees; *recurva*, orange-scarlet, May, 2 ft., California; *ruthenica*, black, May, 1 ft., Caucasus.

Fritillary, see *Fritillaria meleagris*.

Frogbit, see *Hydrocharis Morsus-ranae*.

Fruiting Myrtle, see *Eugenia*.

Fuchsia—*Onagraceae*. Greenhouse and slightly tender flowering shrubs. First introduced late eighteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts good fibrous loam, one

part well-decayed manure and leaf-mould, with liberal quantity of silver or river sand. Position, shady part of greenhouse or window March to July; sunny place outdoors July to Oct.; cool dry part of greenhouse or room remainder of year. Pot old plants in Feb. or March, young ones when needed. Prune old plants in Feb. Water moderately March to May, freely May to Oct., very little at other times. Temp., Oct. to Feb. 40° to 45°, Feb. to Oct. 55° to 65°. Apply liquid or artificial manure to healthy plants showing flower. Pinch out points of shoots frequently in spring and early summer to induce bushy growth. When repotting old plants, remove soil from roots and place in small pots till growth begins, then shift into large size. Syringe foliage Feb. to May. Can be planted outdoors in June and potted and returned to greenhouse in Sept.

CULTURE OF SLIGHTLY TENDER SPECIES: Soil, ordinary, deep rich. Position, well-drained borders, base of south or west walls, or in sheltered position in the open S. of England. Plant, Oct. or April. Prune shoots off close to base in Feb. Protect in winter with layer of dry litter or leaves.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of light sandy soil in temp. 55° in March or April; cuttings of young shoots inserted singly in small pots of sandy soil in temp. 70° to 80° in Jan., Feb. or March, or in cool greenhouse or window in April, May or June.

GREENHOUSE SPECIES CULTIVATED: *F. alpestris*, crimson, summer, 12 to 18 ft., Brazil; *arborescens*, pink, summer, 10 to 15 ft., Mexico; *bacillaris*, rose, summer, 5 ft., Chile; *boliviana*, rose, summer, 5 ft., Bolivia; *cordifolia*, orange, summer, 5 ft., Mexico; *corymbiflora*, deep red, summer, 6 ft., Peru; *dominiana*, scarlet, summer, 5 ft., garden hybrid; *axoniensis*, scarlet, summer, garden hybrid; *fulgens*, scarlet, July, 3 to 4 ft., Mexico; *parviflora*, red, summer, Mexico; *procumbens*, yellow and blue, summer, magenta-crimson berries, habit trailing, New Zealand; *serratifolia*, scarlet and green, summer, Peru; *simblicaulis*, crimson, summer, Peru; *splendens*, scarlet, summer, 6 ft., Mexico; *superba*, scarlet; summer, garden hybrid; *triphylla*, cinnabar red, summer, 1 to 1½ ft., Mexico.

SLIGHTLY TENDER SPECIES CULTIVATED: *F. magellanica* (syn. *F. macrostemma*), scarlet and purple, July, 10 to 20 ft., S. America, and vars. *conica*, scarlet, *discolor*, purple and red, *globosa*, purplish-red, *gracilis*, scarlet and purple, *Riccartonii*, scarlet.

Fuchsia-flowered Gooseberry, see *Ribes speciosum*.

Fumaria (Fumitory)—*Fumariaceae*. Hardy annual climber.

CULTURE: Soil, ordinary. Position, against south-east or west walls, in open borders with shoots running up sticks, or against arbours and trellis-work.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in April where plants are to flower.

SPECIES CULTIVATED: *F. officinalis*, purple, tipped crimson, summer, 3 to 4 ft., Europe (Br.).

Fumitory, see *Fumaria*.

Funkia, see *Hosta*.

Furcraea—*Amaryllidaceae*. Greenhouse succulent plants with leaves in basal rosettes and whitish or greenish flowers in terminal panicles on tall scapes. First introduced late seventeenth century. Leaves, long, fleshy, spined.

CULTURE: Compost, two parts loam, one part old mortar and river sand. Position, pots or tubs in greenhouses; may stand outside June to Sept. Water moderately April to Aug., little afterwards. Pot every five or six years; good drainage essential. Temp., winter 50° to 55°, summer 55° to 65°.

PROPAGATION: By offsets inserted in small pots at any time.

SPECIES CULTIVATED: *F. Bedinghausii*, green, May to Nov., to 15 ft., Mexico; *cubensis*, greenish, Oct. to Nov., 20 ft., Trop. America; *gigantea*, greenish, to 25 ft., Trop. America; *inermis*, 10 ft., Trop. America; *longaeva*, greenish, 30 to 40 ft., Mexico; *macrophylla*, greenish, 30 ft., origin uncertain; *Selloa*, greenish, 15 to 20 ft., Mexico, Colombia, and var. *marginata*.

Furze, see *Ulex*.

Gagea—*Liliaceae*. Small hardy bulbous plants.

CULTURE: Soil, sandy. Position, sunny borders, or in turf. Plant 3 in. deep and 3 in. apart, Aug. to Nov. Lift only when bulbs unhealthy.

PROPAGATION: By offsets, treated as advised for bulbs.

SPECIES CULTIVATED: *G. Liottardii*, yellow, 4 in., April to May, Europe; *lutea* (syn. *G. silvatica*), 'Yellow Star of Bethlehem', yellow, March to May, 6 in., Europe (Br.).

Gaillardia—*Compositae*. Hardy annual and perennial herbaceous plants. First introduced late eighteenth century.

CULTURE: Soil, moderately light, rich. Position, sunny well-drained beds or borders. Plant, March or April. Apply weak liquid manure to plants in flower. Mulch beds with decayed manure in summer.

PROPAGATION: Annual and perennial species by seeds sown $\frac{1}{16}$ in. deep in shallow boxes of light soil in temp. 55° to 65° in April, transplanting seedlings outdoors in June; perennials by cuttings of shoots issuing from roots, inserted in sandy soil under hand-light or in cold frame Aug. to Oct., division of plants Oct. or March, cuttings of roots laid in shallow boxes of sandy soil, Feb. or March.

ANNUAL SPECIES CULTIVATED: *G. amblyodon*, red, autumn, 2 to 3 ft., Texas; *pulchella*, crimson and yellow, 2 to 3 ft., summer, N. America, var. *picta*, orange, red, and yellow, double 1 ft.

PERENNIAL SPECIES CULTIVATED: *G. aristata*, 'Blanket Flower', yellow, autumn, 18 in., N. America, and vars. *grandiflora* and *maxima*. There are many named vars. to be found in trade lists.

Galanthus (Snowdrop; Fair Maids of February)—*Amaryllidaceae*. Hardy bulbous flowering plants.

OUTDOOR CULTURE: Soil, ordinary rich. Position, margins of beds; groups in open or shady borders; banks, rockeries, or in turf. Plant bulbs 2 in. deep and 1 in. apart, Sept. to Dec. Bulbs must only be lifted when they show signs of deterioration.

POT CULTURE: Compost, two parts ordinary soil, one part leaf-mould and sand. Position, cold or warm greenhouse, frame or window. Pot, Sept. to Nov., placing bulbs 1 in. deep and 1 in. apart in 4 or 5 in. pots or shallow pans. Place pots, etc., in cold frame or outdoors and cover with cinder ashes until growth begins. Water moderately till after flowering, then gradually cease. Plant bulbs outdoors following autumn.

PROPAGATION: By seeds sown as soon as ripe $\frac{1}{4}$ in. deep and 2 in. apart in shallow boxes filled with light sandy soil and placed at base of north wall outdoors; offsets treated as bulbs. Seedlings flower when three years old.

SPECIES CULTIVATED: *G. Allenii*, white, Feb. and March, 6 to 9 in., Asia Minor; *byzantinus*, green and white, Feb., 9 to 12 in., S.E. Europe; *caucasicus*, white and green, March, 6 in., Caucasus; *Elwesii*, white, Feb., 9 to 12 in., Asia Minor, and vars.; *Fosteri*, white, Feb., 6 in., Asia Minor; *Ikariae*, white, Feb., 8 in., Nikaria; *nivalis*, 'Common Snowdrop', white, Jan. to March, 6 in., Europe, and vars.; *platyphyllus* (syn. *G. latifolius*), white and green, Feb. and March, 6 in., Caucasus; *plicatus*, 'Crimean Snowdrop', white, Jan. to Feb., 10 to 12 in., Caucasus.

Galax—*Diapensiaceae*. Hardy evergreen perennial. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts peat, leaf-mould and silver sand. Position, ledges of moist rockery or margin of rhododendron beds. Plant, Oct. to March.

PROPAGATION: By division of plants Oct. to March; seeds sown in peaty soil in cold frame in spring.

SPECIES CULTIVATED: *G. aphylla*, 'Wand Plant', 'Carpenter's Leaf', white, July, 3 to 6 in., N. America.

Galaxia—*Iridaceae*. Greenhouse bulbous plants. First introduced late eighteenth century.

CULTURE: Compost, two parts sandy peat, one part light loam. Position, well-

drained pots in cold frame or greenhouse. Pot, Aug. to Nov., placing bulbs with apex just below surface, one in a 5 in. or three in a 6 in. pot. Cover pots with ashes till growth begins. Water moderately when growth commences, freely afterwards, cease after flowering. Repot, annually.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pans or shallow boxes of sandy peat in cool greenhouse or frame Aug. or Sept.; by offsets treated as bulbs Aug. to Nov.

SPECIES CULTIVATED: *G. graminea*, yellow, July, 6 in., S. Africa; *ovata*, yellow, autumn, 6 in., S. Africa.

Gale, see *Myrica Gale*.

Galeandra—*Orchidaceae*. An epiphytic and terrestrial genus. Pseudo-bulbs generally leafy, stem-like. Racemes terminal. Flowers moderately large and attractive.

CULTURE: Compost, three parts of osmunda fibre or peat, with crushed potsherds, one part sphagnum moss, one part loam fibre. Expose in autumn to light, then rest in 60° with occasional waterings. Summer temp. near tropical.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection—*G. Batemanii* (syn. *G. Baueri* (Bateman)), yellowish, whitish, rose-purple, spur yellow, summer, Guatemala, Mexico; *Baueri* (Lindl.), yellowish, flushed purple-brown, spur horizontal, summer, autumn, Brazil; *Devoniana*, brownish-purple, purple, whitish, summer, autumn, Brazil; *flaveola*, yellowish, summer, Brazil, Venezuela; *lacustris* (syn. *G. d'Escagnolleana*), brownish, white and sulphur-yellow, purple rose, summer, Brazil; *lagoensis*, purple and yellow, terrestrial, summer, Brazil; *nivalis*, olive-green, white, summer, Brazil.

Galega—*Leguminosae*. Hardy perennial herbs. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, open borders or shrubberies. Plant, Oct. to March. Cut down flower stems in Oct. Replant every two or three years.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in April in ordinary soil in sunny position; division of roots Oct. to March.

SPECIES CULTIVATED: *G. officinalis*, 'Goat's Rue', blue, summer, 3 to 5 ft., S. Europe, and vars. *alba*, white, *Hartlandii*, blue; *orientalis*, blue, summer, 2 to 3 ft., Caucasus.

Galingale, see *Cyperus*.

Galium (Bedstraw)—*Rubiaceae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary. Position, sunny borders or rock gardens. Plant, Oct. or March.

PROPAGATION: By division when planting or by seeds sown outdoors in April.

SPECIES CULTIVATED: *G. Mollugo*, white, summer, 3 ft., Europe; *olympicum*, white, summer, 2 to 3 ft., Medit. Region; *purpureum*, brownish-red, summer, 9 to 12 in., S. Europe; *pyrenaicum*, white, 1 to 2 ft., summer, Pyrenees; *rubrum*, brown-red, 1½ ft., midsummer, S. Europe.

Galtonia (Spire Lily)—*Liliaceae*. Hardy bulbous flowering plant.

OUTDOOR CULTURE: Soil, ordinary rich, well drained. Position, open sunny borders. Plant, Oct. to March, placing bulbs 6 in. deep and 6 in. apart. Lift and replant only when the bulbs show signs of deterioration.

POT CULTURE: Compost, two parts loam, one part decayed manure and silver sand. Position, cold or warm greenhouse. Pot, Oct. to Dec. to flower in spring; Feb. to April to flower in autumn. Place one bulb with apex just showing through surface of soil in a well-drained 6 in. pot. Cover with ashes in cold frame until growth begins. Water moderately when leaves appear, freely when in full growth; keep nearly dry after flowering. Apply weak liquid manure occasionally to plants in flower. Bulbs not capable of flowering second time in pots.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shallow boxes of sandy soil in cold

frame Oct. or March; offsets treated as bulbs in autumn. Seedlings flower when four or five years old.

SPECIES CULTIVATED: *G. candicans* (syn. *Hyacinthus candicans*), white, fragrant, summer, 2 to 3 ft., S. Africa.

Garcinia—*Guttiferae*. Stove evergreen trees. The fruit of one species is edible and juice of others yields the gamboge of commerce. First introduced late eighteenth century.

CULTURE: Compost, two parts peat, one part loam and sand. Position, pots or boxes in light part of plant stove. Pot and prune, Feb. to March. Temp., March to Oct. 65° to 85°, Oct. to March 55° to 65°. Water moderately Sept. to April, freely other times.

PROPAGATION: By cuttings of firm shoots 2 to 3 in. long inserted in silver sand under bell-glass in temp. 75° to 85° in spring or summer.

SPECIES CULTIVATED: *G. Cambogia*, 'Gamboge-tree', yellow, Nov., 40 ft., E. Indies; *Mangostana*, 'Mangosteen-tree', red, June, 6 to 10 ft., Molucca Islands; *Morella*, 'Ceylon Gamboge', yellowish, 30 ft., India, Malaya.

Gardenia—*Rubiaceae*. Stove evergreen flowering shrubs or small trees. First introduced mid-eighteenth century.

CULTURE: Compost, one part loam, one part peat, one part well-decayed manure and charcoal. Position, well-drained pots, or beds in plant stove. Pot or plant, Feb. or March. Prune into shape, Feb. or March. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 65°. Water moderately Oct. to Feb., freely afterwards. Syringe daily (except when in bloom), March to Sept. Apply liquid manure occasionally to healthy plants in flower. Plants one to two years old produce the best blooms.

PROPAGATION: By cuttings of firm young side shoots 2 to 3 in. long, inserted in well-drained pots of sandy peat under bell-glass in temp. 75° to 85°, Jan. to April.

SPECIES CULTIVATED: *G. grandiflora*, white, fragrant, 20 ft. or more, Cochin-China; *intermedia*, white, fragrant, origin unknown; *jasminoides* (syn. *G. florida*), 'Cape Jasmine', white, fragrant, summer, China and Japan, and vars. *flore-pleno*, double white, *radicans*, white, fragrant; *Thunbergia*, white, fragrant, Jan. to March, to 10 ft., S. Africa. See also *Mitriostigma*. For named hybrids see trade lists.

Garland Flower, see *Hedychium coronarium*.

Garlic, see *Allium sativum*.

Garrya—*Garryaceae*. Slightly tender evergreen shrubs. Flowers (pendulous catkins), male and female borne on separate trees. First introduced early nineteenth century.

CULTURE: Soil, ordinary, well drained. Position, against south or west walls outdoors; sheltered shrubberies S. of England. Plant, Oct. to Nov., or March to May. Male plant only cultivated; female plant very rare in gardens.

PROPAGATION: By cuttings of firm shoots 3 to 4 in. long inserted in sandy soil under hand-light or cold frame Aug. to Sept.; layering shoots in Sept.

SPECIES CULTIVATED: *G. elliptica*, silvery catkins up to 12 in. long, Nov. to Feb., 6 to 12 ft., California; *Thuretii*, a vigorous hybrid with insignificant catkins, but useful as a very fast growing windbreak in maritime and warm localities, 15 ft.

Gas Plant, see *Dictamnus albus*.

Gasteria—*Liliaceae*. Greenhouse succulent plants, stemless, or nearly so, with long thick leaves in rosettes, and flowers in loose racemes. First introduced early eighteenth century.

CULTURE: Compost, two parts loam, one part peat, old mortar and river sand. Position, well-drained pots in sunny greenhouse or window. Pot, March or April. Water moderately April to Sept. Temp., March to Sept. 55° to 65°, Sept. to March 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots or pans of sandy soil, temp. 65°, March to Aug.

SPECIES CULTIVATED: *G. acinacifolia*, orange, summer, S. Africa; *brevifolia*, red, July, S. Africa; *carinata*, red, summer, S. Africa; *Croucheri*, rose, Aug., S. Africa; *lingua* (syn. *G. disticha*), scarlet, July, S. Africa; *pulchra*, scarlet, summer, S. Africa; *verrucosa*, red, July, 3 to 4 in., S. Africa.

× **Gaulnettya**—*Ericaceae*. Hardy evergreen shrub. Bigeneric hybrid between *Pernettya* and *Gaultheria*.

CULTURE: Soil, peaty, cool. Position, semi-shaded or north-facing.

PROPAGATION: By cuttings taken in Aug.; layers.

SPECIES CULTIVATED: *G. wisleyensis*, white, 1 to 2 ft., May to June, hybrid.

Gaultheria—*Ericaceae*. Hardy or half-hardy evergreen shrubs with red, purple or blue berries. First introduced mid-eighteenth century.

CULTURE: Soil, peaty. Position, moist rockeries or margins of open or shady shrubberies and beds. Plant, Sept. to Nov., or March to May.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in bed of peaty soil outdoors in autumn, or removal of rooted offsets in spring.

SPECIES CULTIVATED: *G. adenostrix*, white, June, berries red, 1 ft., Japan; *codonantha*, greenish white, summer, 7 ft., Assam, cool greenhouse; *cuneata*, white, June, 9 in., W. China; *Forrestii*, white, June, berries blue, 3 ft., W. China; *Miqueliana*, white or pinkish, June, berries white, 1 ft., Japan; *nummularioides*, white and pink, summer, trailing, Himalaya; *procumbens*, 'Canada Tea' 'Partridge Berry', 'Creeping Wintergreen', white, July, creeping, N. America; *Shallon*, 'Shallon', white and red, May, 4 ft., N.W. America; *tetramera*, white, June, berries varying shades of blue, W. China; *trichophylla*, pink, May, 3 to 6 in., Himalaya; *Veitchiana*, white, early summer, 1 to 3 ft., W. China.

Gaura—*Onagraceae*. Hardy perennial, but usually grown as an annual.

CULTURE: Position, sunny well-drained beds or borders. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil outdoors April.

SPECIES CULTIVATED: *G. Lindheimeri*, white and rose, July to Oct., 3 to 4 ft., Texas.

Gaya, see *Hoheria*.

Gaylussacia (Huckleberry)—*Ericaceae*. Evergreen or deciduous berry-bearing shrubs. First introduced mid-eighteenth century.

CULTURE AND PROPAGATION: As for *Vaccinium*.

SPECIES CULTIVATED: *G. baccata* (syn. *G. resinosa*), reddish, fruits black, 1 to 3 ft., Eastern N. America; *brachycera*, white or pink, berries blue, 6 to 12 in., Eastern U.S.A.; *dumosa*, white to red, berries black, 1 to 2 ft., Eastern N. America; *frondosa*, greenish-purple, berries blue, 3 to 6 ft., Eastern U.S.A.

Gazania (Treasure-flower)—*Compositae*. Half-hardy perennials. First introduced mid-eighteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Position, well-drained pots in sunny part of greenhouse, or planted outdoors in summer in sunny place on rockery, edging to beds, etc. Pot, March or April. Plant outdoors June. Water very little Oct. to March, moderately other times. Prune into shape, March. Temp., March to Sept. 55° to 75°, Sept. to March 45° to 55°.

PROPAGATION: By cuttings of side shoots removed from base of plant and inserted in boxes of sandy soil or in a bed in cold frame July to Sept.; cuttings may remain in cold frame if protected from frost; seeds sown in sandy soil during early spring in temp. 65°.

SPECIES CULTIVATED: *G. montana*, yellow and black, summer, 6 to 8 in.; *Pavonia*, yellow, brown, and white, summer, 12 in., S. Africa; *rigens*, yellow and black, June, 1 ft., S. Africa; *splendens*, orange, black, and white, summer, 1 ft.,

hybrid, var. *variegata*, foliage creamy-white, flowers orange, black, and white. Also many hybrid vars. of varying colours.

Genista (Broom)—*Leguminosae*. Hardy deciduous flowering shrubs of high ornamental value, and easily grown; excellent for dry banks and stony ground.

CULTURE: Soil, ordinary. Position, shrubbery for tall species, rockery for dwarf. Plant, Oct. to March. Prune after flowering.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep outdoors in March or April; grafting on laburnum in March; budding on similar stocks in July.

SPECIES CULTIVATED: *G. aethnensis*, yellow, June to Aug., 6 to 12 ft., Sicily; *anglica*, 'Needle Furze', yellow, May and June, 1 to 2 ft., Britain; *hispanica*, 'Spanish Broom', yellow, May to July, fragrant, 1 to 2 ft., rounded, N.W. Europe; *pilosa*, yellow, May to June, 1 to $1\frac{1}{2}$ ft., Europe (Br.); *radiata*, yellow, summer, 2 to 4 ft., S. Europe; *silvestris*, spiny, yellow, June and July, S.E. Europe, var. *pungens* (syn. *G. dalmatica*), more spiny; *tinctoria*, 'Dyer's Greenweed', yellow, July to Sept., 1 to 2 ft., Britain, var. *virgata*, more vigorous than type.

Gentiana (Gentian)—*Gentianaceae*. Hardy perennials.

CULTURE: Compost, two parts good loam, one part peat, one part grit or broken limestone and coarse sand. Position, sunny rock garden for dwarf kinds, borders for tall species. All should be kept fairly dry in winter, moist in summer. Plant, Sept., Oct., March or April, top-dress with rotted leaf-mould in March. *G. amoena*, *Andrewsii*, *Cachemirica*, *calycosa*, *depressa*, *Farreri*, *hexa-Farreri*, *hexaphylla*, *Kurroo*, *Lawrencei*, *Loderi*, *ornata*, *Pneumonanthe*, *prolata*, *sikkimensis*, *sino-ornata*, *strangulata* and *Waltonii* dislike lime.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in well-drained pots or pans of sandy soil in cold frame in March; division of plants in March. Seeds sometimes take one or two years to germinate and soil must be kept moderately moist.

SPECIES CULTIVATED: *G. acaulis*, 'Gentianella', blue, spring, 3 in., Europe, and numerous vars.; *amoena*, white and blue, late summer, 3 in., Himalaya; *Andrewsii*, blue, 12 in., June to July, prefers a north aspect, N. America; *asclepiadea*, 'Willow Gentian', blue, 2 ft., July to Aug., Europe, and var. *alba*; *bavarica*, blue, 1 to 2 in., spring, Europe; *bellidifolia*, white, 6 in., late summer, New Zealand; *brachyphylla*, blue, 2 in., spring, Europe; *cachemirica*, blue, 4 to 6 in., late summer, Kashmir; *calycosa*, blue, 12 in., July, N. America; *depressa*, blue, 3 in., Aug., Himalaya; *Farreri*, Cambridge blue, 4 in., Aug. to Sept., Asia; *Froelichii*, light blue, 2 to 3 in., June to July, Austria; *glauca*, deep blue, 2 to 3 in., July, N. America; *gracilipes*, blue, procumbent, July to Aug., China; *hascombensis*, blue, 12 in., late summer, hybrid; *hexa-Farreri*, blue, 3 to 4 in., autumn, hybrid; *hexaphylla*, blue, 3 in., late summer, Asia; *Kurroo*, blue, 6 to 9 in., late summer, Kashmir; *Lawrencei*, blue, procumbent, late summer, Asia; *Loderi*, blue, 4 to 6 in., late summer, Kashmir; *lutea*, yellow, 3 ft., summer, Europe; *Olivieri* (syn. *G. dahurica*), pale blue, 9 in., late summer, Asia Minor; *ornata* (syn. *G. Veitchiorum*), blue, 2 in., autumn, Nepal; *Pneumonanthe*, blue, 9 in., late summer, Europe (Br.); *prolata*, blue, 1 to 2 in., late summer, Sikkim; *pumila*, blue, 2 in., May, Europe; *punctata*, yellow, spotted purple, 18 in., July to Aug., Europe; *pyrenaica*, blue, 3 in., spring and summer, Pyrenees; *saxosa*, white, 3 in., summer, New Zealand; *septemfida*, blue, 9 to 12 in., late summer, Asia, and var. *Lago-dechiana*, blue, single flowers on prostrate stems; *sikkimensis*, blue, prostrate, late summer, Sikkim; *sino-ornata*, blue, 3 in., autumn, China; *strangulata*, blue, prostrate, autumn, Tibet; *verna*, blue, 2 to 3 in., spring, Europe (Br.), and var. *alata*, larger, finer form; *Waltonii*, blue, 9 to 12 in., late summer, Tibet. There are numerous hybrids between the Asiatic species, all of which are lime haters and autumn flowering. The name *G. acaulis*, no longer used by botanists, covers two wild species (*G. Clusii* and *G. Kochiana*) and *G. excisa* (syn. *G. hortorum*); the plant commonly cultivated as '*G. acaulis*' is probably a hybrid.

Geodorum—*Orchidaceae*. A terrestrial genus with tuberous rootstocks. Leaves deciduous or nearly so. Scapes usually basal with the new growth.

CULTURE: Much as for *Phaius*. Compost, three parts fibrous loam, one part chopped sphagnum, one part peat fibre, with sand. A rest must be given in winter, temp. 55° to 60°. Summer temp. 65° to 80° with shading. Well-drained pots; water freely.

PROPAGATION: By offsets if they occur.

SPECIES CULTIVATED: *G. candidum*, white, lip marked red and yellow, summer, Moulmein; *citrinum*, greenish-white, lip yellowish, summer, autumn, Burma, etc.; *dilatatum*, whitish, flesh colour, summer, India, Burma; *pictum*, variable, pink to rose, red-veined on lip, summer, New Guinea, Australia.

Geonoma—Palmae. Stove palm with feather-shaped pale green leaves. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part loam, sand and charcoal. Position, pots in moist shady part of plant stove. Pot, Feb. or March. Water freely Oct. to Feb., abundantly other times. Syringe daily. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 70°.

PROPAGATION: By seeds sown 1 in. deep in above compost in pots in temp. 85°, March; offshoots from base of plants in small pots in temp. 80° to 85°, any time.

SPECIES CULTIVATED: *G. gracilis*, 6 ft., Costa Rica; *pumila*, dwarf species, Colombia.

Geranium (Cranesbill)—Geraniaceae. Hardy herbaceous perennials. For greenhouse 'Geraniums' see *Pelargonium*.

CULTURE: Soil, ordinary rich. Position, tall kinds in sunny well-drained borders, dwarf kinds on sunny rockeries. Plant, Oct., Nov., March or April. Apply weak liquid manure occasionally to established plants in flower.

PROPAGATION: By seeds sown ½ in. deep in ordinary soil in sunny position outdoors, March or April, or in shallow boxes of sandy soil in cold frame or greenhouse, March; division of roots, Oct., Nov., March or April.

SPECIES CULTIVATED: *G. argenteum*, rose, summer, 1 ft., Alps, var. *purpureum*, intense crimson-red; *cinereum*, red, summer, 6 in., Pyrenees, var. *album*, white; *dalmaticum* (syns. *G. macrorrhizum dalmaticum*, *G. microrrhizum*), light rose, June, 4 in., Dalmatia; *Endressii*, rose, summer, 1 ft., Pyrenees; *Farreri*, pink, May, 3 in., Asia; *grandiflorum*, bluish-mauve, June to Sept., 6 in., Himalayas; *ibericum*, blue, summer, 1 ft., Caucasus; *phaeum*, purplish-brown, May to July, 1 ft., Europe; *pratense*, blue, summer, 2 to 3 ft., Britain, and its double blue and double white vars.; *psilostemon* (syn. *G. armenum*), purple, June and July, 2 ft., Orient; *Pylzowianum*, pale pink, summer, 6 to 9 in., Tibet; *Robertianum*, 'Herb Robert', annual or biennial, red-purple, 1½ ft., N. America; *sanguineum*, crimson, summer, 2 ft., Britain, and vars. *album*, white, *prostratum*, dwarf form; *sylvaticum*, blue, summer, 2 to 3 ft., Britain; *tuberosum*, purple, June, 9 in., S. Europe.

Gerbera (Transvaal Daisy)—Compositae. Greenhouse perennial herbs. First introduced late nineteenth century.

CULTURE: Grow in a compost of sandy loam and peat in a temp. of 45° to 50° from Nov. to May, without artificial heat afterwards. Water sparingly from Nov. to April; freely afterwards. Repot annually in spring. No shade required. *G. Jamesonii* may be grown outdoors in warm nooks in mild districts.

PROPAGATION: By seeds sown in sandy peat in March in temp. of 55°; cuttings of side shoots in spring.

SPECIES CULTIVATED: *G. asplenifolia*, purple, summer, 1 ft., S. Africa; *Jamesonii*, 'Barborton Daisy', orange-scarlet, June to Oct., 18 in., S. Africa. Also various coloured hybrids.

German Catchfly, see *Lychnis Viscaria*; **-Iris**, see *I. germanica*; **-Ivy**, see *Senecio mikanioides*.

Germander, see *Teucrium*.

Gesneria—Gesneriaceae. Stove tuberous-rooted herbaceous perennials. Flower-

ing and ornamental foliage. Some authorities have transferred these plants to *Corytholoma* or *Smithiantha*. First introduced mid-eighteenth century.

CULTURE: Compost, two parts fibrous peat, one part loam, one part leaf-mould, with a little decayed manure and silver sand. Position, well-drained pots or pans in shady part of plant stove. Pot, March to flower in summer; May to flower in autumn; June to flower in winter. Place tubers 1 in. deep singly in 5 in. pots, or 1 to 2 in. apart in larger sizes. Water moderately from time growth begins until plants are 3 or 4 in. high, then freely. After flowering gradually withhold water till foliage dies down, then keep dry till potting time. Apply weak liquid manure once or twice a week when flower buds show. Syringing not required. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 65°. Store when foliage has died down on their sides under stage till potting time in temp. of 50° to 55°.

PROPAGATION: By seeds sown on surface of well-drained pots of sandy peat, in temp. 75°, March or April; cuttings of young shoots inserted in pots of sandy peat in temp. 75° to 85° in spring; fully matured leaves pegged on surface of pots in sandy peat in temp. 75° to 85°; stalk ends of leaves inserted vertically in pans of sandy peat in temp. 75° to 85°.

SPECIES CULTIVATED: *G. cardinalis*, scarlet and white, autumn, 12 to 18 in.; *Cooperi*, scarlet, drooping habit, May, Brazil; *Donkarii*, red and yellow, 2 ft., summer, Colombia; *Douglasii*, red and yellow, autumn, 18 in., Brazil; *exoniensis*, orange, scarlet and yellow, winter, 1 ft., hybrid; *Leopoldii*, scarlet, summer, 1 ft., Brazil; *Lindleyi*, yellow and scarlet, July, 1 ft., Brazil; *naegelioides*, rosy pink, autumn, 18 in.; *refulgens*, violet and white, summer, 18 in., hybrid; *tuberosa*, scarlet, 1 ft., Brazil. See also *Isoloma* and *Naegelia*.

Gethyllis—*Amaryllidaceae*. Greenhouse bulbous plants. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Position, well-drained pots in cold greenhouse or frame. Pot, Aug. to Nov., placing bulbs singly in 5 in. pots, with points just below surface. Cover with ashes in cold frame or greenhouse till growth begins. Water moderately from time growth begins till flowers fade; keep quite dry after foliage has died down until potting time. Repot, annually.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in well-drained pots of sandy soil in cold frame or greenhouse, March or April; offsets treated as bulbs at potting time.

SPECIES CULTIVATED: *G. afra*, red and white, summer, 6 in., S. Africa; *ciliaris*, white, summer, 6 in., S. Africa; *lanceolata*, white, June, 9 in., S. Africa; *spiralis*, 'Cape Crocus', white, autumn, 9 in., S. Africa; *villosa*, white, June and July, 9 in. S. Africa.

Geum (Avens)—*Rosaceae*. Hardy perennial flowering herbs.

CULTURE: Soil, ordinary rich. Position, tall species in sunny borders, dwarf species on sunny rockeries. Plant, Oct. to April. Cut down flower stems in Sept.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in shallow boxes or well-drained pots of light soil in cold frame, March or April, or in sunny positions (similar depth and soil) outdoors, April or July; division of plants, Oct. to April.

SPECIES CULTIVATED: *G. Borisii* (of gardens), orange, summer and autumn, 9 to 12 in.; *chiloense* (syn. *G. coccineum*), scarlet, summer, 2 ft., Chile, and var. *plenum*, and numerous garden forms; *Heldreichii*, orange-red, July, 1 ft.; *montanum*, yellow, May, 2 ft., Europe; *reptans*, yellow, summer, trailing, Europe; *rivale*, old rose, summer, 9 to 12 in., Britain.

Gevuina (Chilean Nut, Chile Hazel)—*Proteaceae*. Half-hardy, evergreen shrub or small tree. Native of Chile. Often wrongly spelt Guevina.

CULTURE: Soil, good loamy. Position, sheltered, semi-shady. May be grown outdoors in Cornwall and similar mild climates but elsewhere needs the protection of a greenhouse in winter. No pruning required.

SPECIES CULTIVATED: *G. Avellana*, white, summer, 10 to 20 ft., occasionally more.

Giant Bellflower, see *Ostrowskia*; **-Fennel**, see *Ferula communis*; **-Fern Palm**, see *Macrozamia Peroffskyana*; **-Groundsel**, see *Ligularia Wilsoniana*; **-Lily**, see

Cardiocrinum giganteum; -**Sequoia**, see *Sequoiadendron giganteum*; -**Reed**, see *Arundo Donax*; -**Water Thyme**, see *Lagarosiphon*.

Gilia—*Polemoniaceae*. Annuals, biennials and sub-shrubs, some hardy, including species formerly known as *Hugelia* and *Linanthus*. First introduced early nineteenth century.

CULTURE OF HARDY ANNUALS: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in April where plants are to flower, thinning seedlings in May to 3 in. apart.

CULTURE OF BIENNIALS: Soil, ordinary. Position, sunny beds or borders. Sow in pans or boxes in January in temp. 55° to 60° , pricking out seedlings as soon as large enough to handle and hardening off for planting out in May.

CULTURE OF SUB-SHRUBS: Compost, equal parts fibrous loam, leaf-mould and sand. Sow in pans or boxes in late summer or early autumn in temp. 60° to 65° . Prick out seedlings when large enough and grow on in same temp., either hardening off plants in spring for planting outdoors or else potting them singly for flowering in the greenhouse.

ANNUAL SPECIES CULTIVATED: *G. achilleaefolia*, purplish-blue, Aug., 1 ft., California; *androsacea*, lilac, pink, and white, Aug., 1 ft., California; *densiflora* (syn. *Hugelia densiflora*), lilac, June, 6 in., var. *alba*, white; *dianthoides* (syn. *Fenzlia dianthiflora*), lilac and yellow, July, 4 in., California; *liniflora*, white, summer, 1 ft., California; *micrantha* (syn. *Leptosiphon roseus*), rose, summer, 9 in., California; *tricolor*, orange and purple, June, 1 ft., California.

BIENNIAL SPECIES CULTIVATED: *G. rubra* (syn. *G. coronopifolia*), scarlet, summer, 9 to 18 in., California.

SUB-SHRUBBY SPECIES CULTIVATED: *G. californica*, 'Prickly Phlox', pink, July, 3 ft., California; *montana* (syn. *Linanthus montanus*), white, to 10 in., California, Oregon.

Gillenia—*Rosaceae*. Hardy perennials. First introduced early eighteenth century.

CULTURE: Soil, peaty. Position, moist shady bed or border. Plant, Oct. to Dec. or March. Cut down flowering stems in Sept.

PROPAGATION: By division of roots in March or April.

SPECIES CULTIVATED: *G. stipulata*, white, June, 1 to 2 ft., N. America; *trifoliata*, 'Indian Physic', red or white, July, 2 ft., N. America.

Gillyflower, see *Dianthus Caryophyllus* and *Cheiranthus Cheri*.

Ginkgo (Maidenhair Tree)—*Ginkgoaceae*. Hardy deciduous coniferous tree with ornamental foliage attractively tinted in autumn. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary, well drained. Position, sheltered shrubberies or lawns in the south, against south or west walls elsewhere. Plant Oct. to Feb.

PROPAGATION: By seeds in light sandy soil in cold frame Oct. to March.

SPECIES CULTIVATED: *G. biloba* (syn. *Salisburia adiantifolia*), fruit small, globular, 60 to 80 ft., China, var. *pendula*, 'Weeping Maidenhair Tree'.

Ginseng, see *Panax*.

Gladiolus (Sword Lily)—*Iridaceae*. Half-hardy bulbous flowering plants. First introduced late sixteenth century.

TYPES: Large flowered—Habit vigorous; colours various; height, 2 to 4 ft.; individual flowers open, 4 to 8 in. in diameter. **Primulinus**: Habit less vigorous but free flowering; colours various; height, $1\frac{1}{2}$ to 3 ft.; individual flowers hooded, 1 to 2 in. in diameter. There are now many hybrids intermediate between these two classes. **Colvillei**: Flowers small, widely open, early, usually grown under glass.

OUTDOOR CULTURE: Soil, deep rich, liberally manured. Position, sunny well-drained beds or borders. Plant in late March or April. Place corms 4 in. deep and 6 in. apart. Apply liquid manure when flower buds form. Fix sticks to spikes when 2 or 3 in. high. Lift corms in Nov., dry off in a frost-proof shed or

greenhouse, remove old shrivelled corms, which are useless, from the base of the new corms and store latter in shallow trays in an airy place secure from frost.

POT CULTURE: Compost, two parts loam, one part well-decayed manure and river sand. Position, pots in cold frame, cool greenhouse or window. Pot *Colvillei* vars. Oct. or Nov., placing five corms 1 in. deep in a 6 in. pot; late kinds March or April, one 1 in. deep in a 6 in. pot or three 1 in. deep in an 8 in. pot. Place pots in cold frame till flower spikes show, then remove to greenhouse or window. Water moderately at first, freely afterwards. Apply liquid manure when flower spikes show. After flowering gradually withhold water till foliage dies, then clean off corms and store in trays as with those grown outdoors. Forcing: Pot early kinds Oct. to Dec. Temp., 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pans of light rich soil in Feb., in temp. 55° to 65°; by bulbils (spawn) growing at base of corms, planted 2 in. deep and 6 in. apart in sunny border outdoors, March. Seedlings flower when three years old; bulbils when two years old.

SPECIES CULTIVATED: *G. blandus*, white, red, and yellow, June, 18 in., S. Africa; *byzantinus*, red and purple, June, 2 ft., Asia Minor; *cardinalis*, scarlet, July and Aug., 3 to 4 ft., S. Africa; *Colvillei*, crimson and white, summer, 2 ft., hybrid; *communis*, 'Corn Flag', rose, June to Aug., 1 to 2 ft., S. Europe; *cruentus*, scarlet and white, Sept., 2 to 3 ft., Natal; *primulinus*, 'Maid of the Mist', golden yellow, fragrant, Aug., 3 to 4 ft., Trop. Africa; *psittacinus*, scarlet and yellow, summer, 3 ft., S. Africa; *purpureo-auratus*, yellow and purple, Aug., 3 to 4 ft., S. Africa; *Saundersii*, crimson, pink and white, autumn, 2 to 3 ft., S. Africa; *tristis*, red and yellow, July, 1 ft., Natal. There are many hybrids and vars. in trade catalogues. See also *Watsonia* and *Acidanthera*.

Gladwyn, see *Iris foetidissima*.

Glastonbury Thorn, see *Crataegus monogyna* var. *biflora*.

Glaucidium—*Ranunculaceae*. Herbaceous perennial plants.

CULTURE: Soil, deep, cool, peaty or leaf-mould, perfectly drained. Position, north aspect or partial shade.

PROPAGATION: By careful division of old plants when growth commences.

SPECIES CULTIVATED: *G. palmatum*, deep lilac, 12 in., April to May, Japan.

Glaucium (Horned Poppy; Sea Poppy)—*Papaveraceae*. Hardy biennials.

CULTURE: Soil, ordinary rich. Position, sunny well-drained beds or borders.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in beds of light soil outdoors in May, transplanting seedlings into flowering position in July or Aug.

SPECIES CULTIVATED: *G. corniculatum*, crimson and black, summer, 9 in., Medit. Region, and var. *rubrum* red; *flavum* (syn. *G. luteum*), yellow, summer, 1 to 2 ft., Europe (Br.), etc.

Glecoma—*Labiatae*. Creeping hardy perennial, useful for ground cover in both exposed and shady places.

CULTURE: Soil, ordinary. Position, sunny or shady. *G. hederacea* makes a good basket plant for a cool greenhouse or window or for draping staging in greenhouse.

PROPAGATION: By seeds; division.

SPECIES CULTIVATED: *G. hederacea* (syns. *Nepeta Glechoma*, *N. hederacea*), 'Ground Ivy', 'Field Balm', light blue, leaves silvery, trailing, Europe (Br.), and var. *variegata*, leaves variegated.

Gleditsia—*Leguminosae* (or *Caesalpiniaceae*). Hardy ornamental deciduous trees with green, feather-shaped leaves and shoots armed with exceptional spines, up to 6 in. long on *G. caspica*. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, sheltered borders or shrubberies. Plant, Oct. to Feb.

PROPAGATION: By seeds sown in light soil outdoors in March, transplant seedlings when two years old.

SPECIES CULTIVATED: *G. aquatica* (syn. *G. monosperma*), 'Water Locust', green,

July, 20 to 30 ft., United States; *caspica*, green, 20 to 30 ft., N. Persia; *tri-acanthos*, 'Honey Locust', 'Three-thorned Acacia', green, summer, 30 to 60 ft., attractive frond-like leaves, United States.

Gleichenia (Umbrella Fern; Net Fern)—*Gleicheniaceae*. Ornamental stove and greenhouse ferns with feather-shaped fronds and creeping stems. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous peat, one part fibrous loam, charcoal and sand. Position, well-drained pans in shady stove or greenhouse. Pot, Feb. or March. Water moderately in winter, freely at other times. Syringing unnecessary. Temp. stove species, Sept. to March 55° to 65°, March to Sept. 65° to 75°; greenhouse species, Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By spores sown on surface of sandy peat in well-drained pots under bell-glass at any time of year; division of creeping stems, Feb. or March.

STOVE SPECIES CULTIVATED: *G. cincinnata* (syn. *G. microphylla*), 6 ft., Australia, New Zealand, Malay; *dicarpa*, 6 ft., Australia, New Zealand; *linearis* (syn. *G. dichotoma*), 6 ft., Tropics; *rupestris*, 6 ft., Tropics.

Globularia (Globe Daisy)—*Globulariaceae*. Hardy sub-shrubs and perennial herbs. First introduced early seventeenth century.

CULTURE: Soil, ordinary moist. Position, sunny rockeries or margins of borders. Plant, Oct., Nov., March or April. *G. Alypum* may be grown in a greenhouse.

PROPAGATION: By seeds sown on surface in boxes of light sandy soil in cold frame in March or April; division of plants, Oct. or April.

SPECIES CULTIVATED: *G. Alypum*, blue, Aug., 2 ft., shrubby, S. Europe; *cordifolia*, blue, June, 6 in., shrubby, S. Europe; *incanescens*, blue, 6 in., summer, S. Europe; *nudicaulis*, blue, summer, 6 in., herbaceous, Europe; *repens* (syn. *G. nana*), blue, 1 in., summer, Europe; *stygia*, blue, 4 in., summer, Greece; *trichosantha*, blue, summer, 6 to 8 in., herbaceous, Asia Minor; *vulgaris*, blue, summer, 6 to 12 in., herbaceous, S. Europe.

Globe Amaranth, see *Gomphrena globosa*; **-Artichoke**, see *Cynara Scolymus*; **-Flower**, see *Trollius europaeus*; **-Mallow**, see *Sphaeralcea*; **-Thistle**, see *Echinops*.

Gloriosa—*Liliaceae*. Stove flowering, deciduous, tuberous-rooted climbers. First introduced late seventeenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould, decayed manure and silver sand. Position, well-drained pots, with shoots trained to roof or trellis. Pot, Feb., placing tubers 2 in. deep, one in a 6 in. pot or several in an 8 or 12 in. pot. Water moderately till growth is well advanced, then freely. After flowering gradually withhold water and keep soil quite dry till potting time. Temp., Feb. to Sept. 70° to 85°, Sept. to Feb. 55° to 65°.

PROPAGATION: By seeds inserted singly $\frac{1}{4}$ in. deep in 3 in. pots filled with light soil in temp. 75° in Feb. or March; offsets removed from large tubers at potting time.

SPECIES CULTIVATED: *G. Carsonii*, yellow and brown, 6 to 8 ft., Trop. Africa; *Rothschildiana*, ruby red and yellow, summer, Uganda; *superba*, 'Glory Flower', orange and red, summer, 6 to 10 ft., Tropics; *virescens*, 'Mozambique Lily', yellow and red, summer, 5 ft., Trop. Africa, and vars. *Plantii* and *grandiflora*.

Glory Bower, see *Clerodendron*; **-Flower**, see *Eccremocarpus*; **-Lily**, see *Gloriosa*; **-of-the-Marsh**, see *Primula helodoxa*; **-of-the-Snow**, see *Chionodoxa*; **-of-the-Sun**, see *Leucocoryne ixoides*; **-Pea**, see *Clanthus Dampieri*.

Glottiphyllum—*Aizoaceae*. Greenhouse succulent plants.

CULTURE: Compost, six parts sharp sand, three parts rich loam, two parts leaf-mould, one part each mortar rubble and crushed brick. Position, well-drained pots in sunny greenhouse or window, or bed on greenhouse staging. Between June and Sept. may be put outside in sunny, very sandy position, not watered, and protected from excess rain. Plant or pot, June. Water sparingly, June to

Jan.; keep dry rest of year. Temp., Oct. to Jan. 40° to 55°, Feb. to Mar. 35° to 45°, April to Sept. 45° and over.

PROPAGATION: By seeds sown in close atmosphere, temp. 55° to 60°, April or Sept.; stem cuttings, which should first be well dried, June, temp. 60°.

SPECIES CULTIVATED: (A selection). *G. depressum*, yellow, Sept. to Jan., S. Africa; *linguiforme* (syn. *Mesembryanthemum linguiforme*), yellow, Sept. to Jan., S. Africa; *longum* (syn. *M. longum*, *M. pustulatum*), yellow, Sept. to Jan., S. Africa.

Gloxinia, see *Sinningia*.

Glycine—*Leguminosae*. Erect or twining plants grown for human food, forage and oil. Much grown in the East.

CULTURE: As for French Bean, but a sunny and sheltered position should be chosen.

PROPAGATION: By seed.

SPECIES CULTIVATED: *G. Max* (syns. *G. Soja*, *G. hispida*, *Soja Max*), 'Soybean', 'Soya', white or purple, inconspicuous, pods to 3 in. long, brown and hairy, erect to 1 to 6 ft., annual, China, Japan.

Glycyrrhiza—*Leguminosae*. Hardy herbaceous perennials. Liquorice is obtained from the roots of *G. glabra*. First introduced mid-sixteenth century.

CULTURE: Soil, deep, rich sandy. Position, open sunny. Plant, Feb. or March, 18 in. apart and 3 in. deep in rows 3 ft. asunder. Cut down foliage and remove creeping stems close to root in Nov. Roots ready for use the third year.

PROPAGATION: By division of creeping stems in Feb. or March.

SPECIES CULTIVATED: *G. glabra*, 'Liquorice', blue, May to Sept., 3 ft., Medit. Region; *lepidota*, 'Wild Liquorice', yellow, to 5 ft., N. America.

Gnidia—*Thymelaeaceae*. Greenhouse evergreen flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, two parts fibrous peat, one part loam and silver sand. Position, well-drained pots near glass in airy greenhouse during autumn, winter and spring, cold frame June to Sept. Pot, March. Press compost firmly in pots. Prune straggling shoots into shape directly after flowering. Water carefully, giving sufficient to keep soil uniformly moist, rain, not spring, water essential. Temp., Oct. to March 40° to 45°, March to July 45° to 55°.

PROPAGATION: By cuttings of young shoots 2 in. long in sandy peat in well-drained pots under bell-glass in temp. 45° to 55° in March, April or May.

SPECIES CULTIVATED: *G. denudata*, yellow, summer, 18 in., S. Africa; *pinifolia*, white, fragrant, spring, 2 ft., S. Africa.

Goat Root, see *Ononis Natrix*; -**Willow**, see *Salix caprea*.

Goat's Beard, see *Aruncus sylvestris*; -**Rue**, see *Galega officinalis*; -**Thorn**, see *Astragalus Tragacantha*.

Godetia—*Onagraceae*. Hardy annuals, related to *Oenothera* and formerly included in that genus.

CULTURE: Soil, ordinary. Position, sunny or partly shady.

POT CULTURE: Compost, two parts good soil, one part leaf-mould, one part well-decayed manure and sand. Position, well-drained 6 in. pots in cold frame, greenhouse or window. Water moderately at first, freely when in full growth. Apply liquid manure twice weekly when flower buds appear.

PROPAGATION: Sow seeds in March or April where they are to bloom, thin outdoor seedlings to 6 in. apart in June.

SPECIES CULTIVATED: *G. amoena*, 'Farewell to Spring', rose and crimson, summer, 1 to 2 ft., California; *grandiflora* (syn. *Oenothera Whitneyi*), red, crimson or white, summer, 6 to 12 in., California; *viminea*, purple and crimson with dark centre, short branched, to 2 ft., California. See trade lists for numerous vars.

Goethea—*Malvaceae*. Stove evergreen shrubs. First introduced mid-nineteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Pot, March. Shady position desirable. Water freely from March to Sept., moderately in winter. Syringe freely during summer months. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings in sandy soil under bell-glass in steady bottom heat.

SPECIES CULTIVATED: *G. intermedia*, white, 2 ft., hybrid; *kermesina*, white, 1 ft., hybrid; *makoyana*, crimson, 2 ft., Brazil; *strictiflora*, yellowish, tinged red, Aug., 1½ ft., Brazil. See also Pavonia.

Gold Dust, see *Alyssum saxatile*; **-thread**, see *Coptis*; **-Fern**, see *Pityrogramma calomelanos* var. *aureo-flava*.

Golden Aster, see *Chrysopsis*; **-Bells**, see *Forsythia*; **-Chain**, see *Laburnum anagyroides*; **-Club**, see *Orontium aquaticum*; **-Feather**, see *Chrysanthemum Parthenium* var. *aureum*; **-Hair**, see *Chrysocoma coma-aurea*; **-Larch**, see *Pseudolarix*; **-Lily**, see *Lycoris aurea*; **-Marguerite**, see *Anthemis tinctoria*; **-Rain**, see *Laburnum anagyroides*; **-rod**, see *Solidago*; **-Saxifrage**, see *Chrysosplenium*; **-Thistle**, see *Scolymus hispanicus*; **-Star**, see *Chrysogonum virginianum*; **-Wattle**, see *Acacia pycnantha*.

Goldilocks, see *Linosyris vulgaris*.

Gomeza—*Orchidaceae*. An epiphytic genus of about 10 species, allied to *Odontoglossum*. Scapes often arched from base of pseudo-bulbs. Flowers many, not large, often fragrant.

CULTURE: Compost, etc., as for *Odontoglossums*. Winter temp. should be 55°, no decided rest, but in winter must not be watered too frequently.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *G. Barkeri*, greenish-yellow, spring, Brazil; *crispa*, greenish-yellow, primrose scented, winter, spring, Brazil; *planifolia*, greenish-yellow, fragrant, spring, summer, Brazil.

Gomphia—*Ochnaceae*. Stove evergreen flowering shrub.

CULTURE: Compost, two parts fibrous loam, one part peat, little silver sand. Position, pots in light part of plant stove. Pot, Feb. or March. Press compost down firmly in pot. Prune into shape Feb. or March. Water moderately Oct. to March, freely afterwards. Syringe daily in summer. Temp., March to Oct. 65° to 75°, Oct. to March 50° to 60°.

PROPAGATION: By cuttings of firm young shoots, 2 to 3 in. long, inserted in pots of silver sand under bell-glass in temp. 75° in spring.

SPECIES CULTIVATED: *G. decorans*, yellow, spring, 10 to 15 ft., Brazil; *theophrasta*, golden-yellow, May, 10 to 12 ft., Brazil.

Gompholobium—*Leguminosae*. Greenhouse, evergreen, trailing and erect, flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts rough peat, one part rough loam, charcoal and sand. Position, well-drained pots in light part of greenhouse. Pot, Feb. or March. Prune into shape after flowering. Water carefully at all times. Temp., Sept. to April 45° to 50°, April to Sept. 50° to 60°. Ventilate greenhouse freely in summer.

PROPAGATION: By cuttings of young shoots 2 in. long inserted in well-drained pots of sandy peat under bell-glass in temp. 45° to 55° in March or April.

SPECIES CULTIVATED: *G. grandiflorum*, yellow, June, 2 ft., Australia; *polymorphum*, yellow, scarlet and purple, spring, 2 ft., Australia; *venustum*, purple, spring, 3 ft., Australia.

Gomphrena—*Amaranthaceae*. Greenhouse flowering annual. First introduced early eighteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould, well-decayed cow manure and sand. Position, warm greenhouse, exposed to light. Sow seeds ½ in. deep in well-drained pots of light soil in temp. 75° in March. Transplant seedlings 1 in. apart when 1 in. high in light soil in well-drained pots and keep in temp. of 60° to 75°. When seedlings have formed four leaves place singly in 4 in. pots. Transfer them in June to 5 in. pots and keep near the glass. Water mod-

erately. Syringe foliage twice daily. Apply liquid manure when flowers appear. Summer temp., 55° to 65°. Cut flowers immediately they are fully developed for drying for winter decoration.

SPECIES CULTIVATED: *G. globosa*, 'Globe Amaranth', white, red or purple, summer, 12 to 18 in., India, and vars. *aurea superba*, yellow, *carnea*, flesh, *purpurea*, purple, and *nana*, dwarf.

Gongora—*Orchidaceae*. An epiphytic genus with stout ribbed pseudo-bulbs. Spikes usually arched from their base. Flowers often many, grotesque in shape, gaining the title 'Punch and Judy Orchids'.

CULTURE: Compost, temps., etc., as for Stanhopeas, and baskets are preferable.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection—*G. armeniaca* (syn. *Acropera armeniaca*), yellow, summer, Nicaragua; *atropurpurea*, purplish-brown, variable, various seasons, Brazil, British Guiana; *bufonia*, yellowish-white, spotted dull purple, various seasons, Brazil; *galeata* (syn. *Acropera Loddigesii*), tawny yellow, brownish-red, variable, summer, Mexico; *gratulabunda*, yellow, dotted dull red, various seasons, Colombia; *grossa*, whitish or yellowish, spotted purple, summer, Ecuador; *portentosa*, buff yellow, purple spotted, deep yellow, spring, Columbia; *quinquenervis*, yellowish, marked brown-purple, summer, Guatemala, Peru, Brazil; *Sanderiana*, yellowish, brown, rose, lip bright yellow, summer, Peru; *scaphephorus*, yellowish-white, blotched purple-brown and purple, summer, Peru.

Goniophlebium, see *Polypodium*.

Good King Henry, see *Chenopodium Bonus-Henricus*.

Goodyera—*Orchidaceae*. Terrestrial orchids of the *Anoectochilus* group in which many species with ornate foliage are included. The habit is that of *Anoectochilus*. The flowers are small.

CULTURE: Compost for the tropical species as for *Anoectochilus*, and similar conditions should be given. The hardy species given a compost of leaf-mould, peat and sand. Position, rather shady in drained pockets in rockery. The cool house species: Similar compost and position in well-drained pans. A cool fernery is often suitable.

PROPAGATION: As for *Anoectochilus*.

SPECIES CULTIVATED: A selection with leaf coloration—*G. colorata*, greenish brown, nerved red-brown, Java; *hispida*, green with rose-red veins, Himalaya; *japonica*, velvet-green, shaded brown, mid-rib white or pink-flushed; *macrantha*, dark green, pale green, bordered yellow, Japan; *pubescens*, green with grey or yellowish stripe and reticulations, N. America; *repens*, dark green with or without green marbling, spiralled, Britain, N. Hemisphere.

Gooseberry, see *Ribes Grossularia*.

Gordonia—*Theaceae* (or *Ternstroemiaceae*). Slightly tender evergreen shrubs with snowy white flowers. First introduced mid-eighteenth century.

CULTURE: Soil, peat and leaf-mould. Position, warm sheltered borders or against south walls. Plant, April.

PROPAGATION: By seeds; layers in spring; greenwood cuttings under glass.

SPECIES CULTIVATED: *G. axillaris* (syn. *G. anomala*), white, summer, 15 ft., S. China; *Lasianthus*, 'Loblolly Bay', white, to 60 ft., N. America. See also *Franklinia*.

Gorse, see *Ulex*.

Gossypium (Cotton-plant)—*Malvaceae*. Stove perennial herbs. Fruit (capsule) furnishes cotton of commerce. First introduced late sixteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and little sand. Position, well-drained pots in sunny part of stove. Pot, March or April. Water moderately Sept. to April, freely afterwards. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light soil in temp. 65° to 75°, March or April. Transplant seedlings when 1 in. high singly into 2 in. pots.

SPECIES CULTIVATED: *G. barbadense*, yellow and purple, Sept., 5 ft., Tropics; *herbaceum*, yellow and purple, summer, 3 to 4 ft., E. Indies.

Grammanthes—*Crassulaceae*. Half-hardy annual. First introduced mid-eighteenth century.

CULTURE: Soil, light sandy. Position, sunny rockeries.

PROPAGATION: By seeds sown on surface of sandy soil in well-drained pans in temp. 60° to 65° in March. Transplant seedlings outdoors in May.

SPECIES CULTIVATED: *G. chloraeflora*, orange-yellow and red, summer, 3 to 4 in., S. Africa.

Grammatocarpus—*Loasaceae*. Half-hardy annual climber.

CULTURE: Sow seeds in gentle heat in March, harden seedlings off later on, and plant in June. Ordinary soil. Suitable for low sunny trellises, vases, etc.

SPECIES CULTIVATED: *G. volubilis*, yellow and red, summer, 3 ft., Chile.

Grammatophyllum—*Orchidaceae*. An epiphytic genus in two contrasting sections, one with tall, stout, stem-like pseudo-bulbs forming huge plants, the other with much shorter, stouter pseudo-bulbs; the long spikes are produced from the base. Under cultivation neither of the species given here completes growth in one season.

CULTURE: Compost, three parts of osmunda fibre, one part loam fibre, one part sphagnum moss with potsherds broken according to size of plant. A warm moist atmosphere for all throughout the year, tropical in summer, 65° in winter for the pseudo-bulbed kinds, and a moderate rest. Tall-stemmed species 70° in winter with waterings. Pots well drained, or tubs for the large growing. Shading is required in summer.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: The following are very similar, so much so that several are considered forms of *G. scriptum*. *G. Fenzlianum*, greenish-yellow, chocolate, summer, Amboina; *Guilielmitii*, greenish, blotched reddish-brown, summer, New Guinea; *Measuresianum*, bright green, purplish, chocolate, Philippines; *multiflorum*, greenish-yellow suffused and marked purple-brown, summer, Philippines; *Rumphianum* (syn. *G. Seegeranum*), pale yellowish-green, blotched brown, lip lined purple, summer, Moluccas, Borneo; *scriptum*, greenish-yellow, spotted dark brown, summer, Moluccas. Species with pseudo-bulbs up to 10 ft. high, scapes 6 or 7 ft.: *papuanum*, large, green, spotted brown-red, the basal flowers are abortive, spring, New Guinea; *speciosum*, large, yellow, blotched and marked wine-purple, Malaya, Moluccas.

Granadilla, see *Passiflora quadrangularis* and *P. edulis*.

Grape, see *Vitis*; **-Fern**, see *Botrychium Lunaria*; **-Fruit**, see *Citrus paradisi*; **-Hyacinth**, see *Muscari*.

Grass of Parnassus, see *Parnassia palustris*.

Greek Valerian, see *Polemonium caeruleum*.

Greenbriar, see *Smilax*.

Green Man Orchis, see *Aceras*.

Greenovia—*Crassulaceae*. Tufted perennial herbs, natives of Canary Islands, formerly included in *Sempervivum*.

CULTURE: As *Aeonium*.

PROPAGATION: As *Aeonium*.

SPECIES CULTIVATED: *G. diplocycla*, to 8 in., rosette 10 in.; *dodrentalis*, to 10 in., many long-stemmed offsets.

Grevillea—*Proteaceae*. Greenhouse and hardy, evergreen, flowering shrubs. First introduced late eighteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts fibrous peat, turfy loam and silver sand. Position, well-drained pots in airy greenhouse, window or dwelling-room. *G. rosmarinifolia* may be grown outdoors in the south. Pot, March or April. Water moderately Sept. to April, freely afterwards. Prune off points of shoots occasionally to induce bushy growth. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

CULTURE OF HARDY SPECIES: Soil, peaty. Position, sheltered shrubberies S. of England; against south walls other parts. Plant, Oct. or April. Prune, April. Protect in severe weather.

PROPAGATION: Greenhouse species by seeds sown $\frac{1}{4}$ in. deep in well-drained pots of light soil in temp. 65° to 70° in March; cuttings of young shoots 3 in. long, with small heels of old wood attached, inserted in sandy soil in well-drained pots under bell-glass in temp. 75° to 80° in March, April or May; hardy species by seeds sown $\frac{1}{4}$ in. deep outdoors in March or April; layers in Oct. or Nov.; grafting in March.

GREENHOUSE SPECIES CULTIVATED: *G. acanthifolia*, reddish, June, 4 ft., Australia; *asplenifolia*, pink, July, 12 to 15 ft., Australia; *Banksii*, red, Aug., 15 ft., Australia; *punicea*, deep red, July, 6 ft., Australia; *robusta*, 'Silk Bark Oak', orange, summer, 10 to 20 ft., Australia; *rosmarinifolia*, red, summer, 6 ft., Australia.

HARDY SPECIES CULTIVATED: *G. juniperina* (syn. *G. sulphurea*), yellow, summer, 10 ft., Australia.

Griffinia—*Amaryllidaceae*. Stove evergreen bulbous flowering plants. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part peat, decomposed sheep manure and sand. Position, well-drained pots on a bed or stage heated beneath to temp. 85° in plant stove. Pot, June or July. Press compost down firmly. Repotting not needed more often than once every three or four years. Water moderately Oct. to April, freely afterwards. Syringe freely in summer. Top-dress established plants annually in March with rich compost. Temp., March to Sept. 70° to 80°, Sept. to Dec. 55° to 65°, December to March 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in temp. 85° in Feb. or March; offsets removed from old bulbs and placed singly in 3 in. pots at potting time.

SPECIES CULTIVATED: *G. Blumenayia*, white with pale rose, summer, 1 ft., Brazil; *hyacinthina*, 'Blue Amaryllis', blue, summer, 18 in., Brazil; *ornata*, bluish-lilac, summer, 18 in., Brazil.

Grindelia—*Compositae*. Coarse hardy perennial plants.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Plant 6 ft. apart in March or April.

PROPAGATION: By seeds sown in warm greenhouse in Feb. or March; division at planting time.

SPECIES CULTIVATED: *G. chilensis* (syn. *G. speciosa*), shrubby, 18 in., orange-yellow, Argentine; *integrifolia*, yellow, summer, to 3 ft., N. America; *robusta*, 'Californian Gum Plant', yellow, summer, to 2 ft., California.

Griselinia—*Cornaceae*. Slightly tender evergreen shrubs. Male and female flowers produced on separate plants, berries seldom seen. First introduced mid-nineteenth century. Excellent near the sea and useful hedge shrubs.

CULTURE: Soil, ordinary, poor, including chalk. Maritime shrubs. Plant, Oct., Nov., March and April. Prune into shape in April.

PROPAGATION: By cuttings in sandy soil in sheltered border or cold frame Sept. to Nov.

SPECIES CULTIVATED: *G. littoralis*, green, spring, 20 to 30 ft., New Zealand, and var. *variegata*, with white variegation; *lucida*, green, spring, 10 to 12 ft., New Zealand.

Grobya—*Orchidaceae*. An epiphytic genus, three species. Pseudo-bulbs clustered, small, scapes from their base. Flowers rather small.

CULTURE: Compost, three parts osmunda fibre, one part sphagnum moss. Peat and sand can be added. Pans or small baskets. Can be grown in the cool house, but winter temp. should be 55°. Water should then be very infrequently given.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: *G. Amherstiae*, yellowish-brown, spotted purplish-brown, lip purplish, autumn, Brazil; *fascifera*, ochre yellow, purple spots, spring, Brazil; *galeata*, greenish-yellow, shaded purple, early autumn, Brazil.

Gromwell, see *Lithospermum prostratum*.

Grossularia, see *Ribes*.

Ground Ivy, see *Glechoma hederacea*; **-nut**, see *Arachis hypogaea*.

Groundsel, see *Senecio*.

Guava, see *Psidium Guajava*.

Guelder Rose, see *Viburnum Opulus* var. *roseum*.

Guernsey Lily, see *Nerine sarniensis*.

Gum Arabic, see *Acacia Senegal*; **-Cistus**, see *Cistus cypricus*; **-Plant**, see *Grindelia*; **-Tree**, see *Eucalyptus*.

Gumbo, see *Hibiscus esculentus*.

Gunnera (Prickly Rhubarb)—*Haloragidaceae*. Hardy herbaceous perennials. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary rich. Position, damp, sunny sheltered margins of ponds or bogs. Plant, March or April. Protect with leaves in winter. Water abundantly in dry weather.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in pans of light soil in temp. 55° to 65° in March, transplanting seedlings outdoors in June; division of plants in spring.

SPECIES CULTIVATED: *G. chilensis* (syn. *G. scabra*), 'Chile Rhubarb', leaves 4 to 6 ft. in diameter, 6 to 10 ft., Chile; *manicata*, leaves 5 to 10 ft. in diameter, 4 to 10 ft., Brazil; *magellanica*, very dwarf, 3 in., S. Chile.

Guzmania—*Bromeliaceae*. Stove, terrestrial or epiphytic herbs with stiff leaves in basal rosettes, and yellow or white flowers in spikes, often showily bracted. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous loam, rough peat and leaf-mould. Pot, March. Water freely always. Good drainage essential. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By offshoots inserted in small pots at any time.

SPECIES CULTIVATED: *G. Bevensayana*, white with scarlet bracts, 1 ft., Ecuador; *lingulata*, yellowish-white, summer, 1 ft., bracts purplish-red, epiphytic, Trop. America; *musaica* (syn. *Tillandsia musaica*), yellowish, stemless, bracts yellow and rose, terrestrial, Colombia. See also *Tillandsia*.

Gymnadenia—*Orchidaceae*. A tuberous terrestrial genus resembling *Orchis*, but very near to *Habenaria* to which many species have been referred.

CULTURE: *G. conopsea*, prefers a rather moist position in a well-drained, rather sandy loam; *albida*, a peaty loam.

PROPAGATION: Seldom effected.

SPECIES CULTIVATED: *G. albida*, small, creamy-white, spur shorter than ovary, early summer, Britain, Europe, Asia; *conopsea*, small, variable, usually mauve, early summer, Britain, Europe, Japan.

Gymnocalycium—*Cactaceae*. Greenhouse succulent plants, sometimes included in *Echinocactus*.

CULTURE: As *Echinocactus*.

PROPAGATION: As *Echinocactus*.

SPECIES CULTIVATED: *G. gibbosum*, white, June, 4 in., Mexico; *multiflorum*, white, summer, 5 in., Mexico; *Weissianum*, pink, campanulate, Argentine.

Gymnocladus—*Leguminosae*. Slightly tender deciduous trees with feather-shaped, bluish-green leaves. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary, well drained. Position, shady shrubberies or lawns. Plant, Oct. to Feb. Prune young trees, Jan.

PROPAGATION: By imported seeds sown in light soil in shady, cool greenhouse in Oct., Nov., March or April; root cuttings in March.

SPECIES CULTIVATED: *G. dioica* (syn. *G. canadensis*), 'Coffee Tree', white, May to July, 60 ft., N. America, var. *folia-variegata*, variegated foliage.

Gymnogramma, see *Pityrogramma* and *Coniogramme*.

Gymnothrix, see *Pennisetum*.

Gynura—*Compositae*. Stove perennials with ornamental foliage and purple-tinted leaves.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, pots in partial shade. Pot in March. Water freely March to Oct., moderately afterwards. Temp., March to Oct. 70° to 80°, Oct. to March 55° to 65°.

PROPAGATION: By cuttings in spring.

SPECIES CULTIVATED: *G. aurantiaca*, 2 ft., Java; *bicolor*, 3 ft., Moluccas.

Gypsophila—*Caryophyllaceae*. Hardy perennial and annual herbs. Flowers valuable for cutting. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary, freely mixed with old mortar or brick rubbish. Position, dryish well-drained borders for erect species; sunny rockeries and margins of borders for dwarf species. Plant, Oct., Nov., March or April. Cut down flower stems in Oct.

PROPAGATION: Annual species by seeds sown in April on surface of soil where plants are to flower, thinning seedlings out to 3 to 6 in. apart when 1 in. high; perennial species by seeds sown in sunny position outdoors in April, transplanting seedlings to permanent position in June, July or Aug.; *G. paniculata* by cuttings of secondary laterals, 2 in. long, in silver sand under bell-glass in gentle bottom heat during June and July; trailing species by division in spring and cuttings.

ANNUAL SPECIES CULTIVATED: *G. elegans*, white, June to Oct., 12 to 18 in., Caucasus; *viscosa* (syn. *G. rosea*), rose, fragrant, summer, 12 to 18 in., Asia Minor.

PERENNIAL SPECIES CULTIVATED: *G. acutifolia*, white or rosy, autumn, 4 ft., Caucasus; *aretioides*, white, spring, 1 in., Caucasus; *cerastioides*, white, veined red, May to Sept., 2 in., Himalaya, var. *flore-pleno*, double flowers, and numerous improved garden forms; *Oldhamiana*, 2½ ft., pinkish, Japan; *paniculata*, 'Chalk Plant', white, summer, 2 to 3 ft., Europe; *repens*, white, summer, 6 in., Alps, and vars. *rosea* and *monstrosa*; *Rokejeka*, 2 ft., pink or violet, Egypt, Asia Minor; *Stevenii*, white, summer, 2 ft., Caucasus; *tenuifolia*, soft pink, summer, 6 in., Caucasus.

Habenaria—*Orchidaceae*. A very large terrestrial deciduous genus, in both hemispheres. Roots usually tuberous. The differences between *Habenaria*, *Platanthera* and *Bonatea* are so slight that for horticultural purposes they may be regarded as one, and are so treated here. The flowers in some are remarkable for the development of the rostellum lobes and the lobe-like division of the petals.

CULTURE: The British species are amenable in outdoor gardens, and not particular as to soil, preferring a sandy loam. The North American species given might be hardy but early growths are liable to receive damage by frost. Compost for exotic species, three parts loam, one part leaf-mould, with sand. The kinds generally cultivated need a decided rest; when dormant the pots should be placed on a shelf near the glass. Temp. around 60°. Repot early in spring. Summer temp. up to 80° with shade. Water frequently as the growths gain strength.

PROPAGATION: Seldom effected. Occasionally by separation of the tubers when repotting.

HARDY SPECIES CULTIVATED: A selection—*H. bifolia*, fragrant, white, green-tinged, spur twice as long as ovary, summer, Britain, Europe, N. Asia, var. *chlorantha*, greener, summer; *blephariglottis*, white, summer, N. America; *ciliaris*,

yellowish, lip fringed, summer, N. America; *cristata*, golden yellow, summer, N. America; *dilatata*, white, summer, N. America, and var. *leucostachys*; *Elwesii*, greenish, yellow, lip in 3 lobes, summer, Nilgiri Hills; *fimbriata*, lilac-rose, summer; *pusilla* (syn. *H. militaris*), greenish, red, lip scarlet or cinnabar-red, autumn, Cochin-China; *viridis*, small, greenish or yellowish, early summer, Britain, Europe, N. Asia.

The following group is attractive and popular: *H. carnea*, rose-flesh, autumn, Penang; *pusilla* (syn. *H. militaris*), greenish, red, lip scarlet or cinnabar-red, autumn, Cochin-China.

Haberlea—*Gesneriaceae*. Hardy herbaceous tufted perennial. First introduced late nineteenth century.

CULTURE: Soil, fibrous sandy peat. Position, vertical fissures of rockery in shade. Plant, Oct., March or April. Water freely in dry weather.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots or pans of sandy peat in cold frame in March or April; by division of plants in March or April.

SPECIES CULTIVATED: *H. Ferdinandi-Coburgii*, white and lilac, 4 to 6 in., May, Bulgaria; *rhodopensis*, lavender and white, 6 in., May, Balkans, var. *virginalis*, white.

Hablitzia—*Chenopodiaceae*. Rather uninteresting hardy herbaceous climber. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, base of naked trunks of trees, south or west trellises, arbours, walls or fences. Plant, Oct. or March. Cut down stems to the ground in Oct.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sunny place outdoors in March or April, or similar depth in boxes of light soil in greenhouse or cold frame in March, transplanting seedlings outdoors in May or June; by division of roots Oct. or April.

SPECIES CULTIVATED: *H. tamnoides*, green, summer, 8 to 10 ft., Caucasus.

Habranthus—*Amaryllidaceae*. Slightly tender bulbous plants, sometimes included in the genus *Zephyranthes*.

CULTURE: Soil, light sandy loam. Position, well-drained sunny beds, borders or rockeries. Plant, Aug. to Nov., placing bulbs 3 to 4 in. deep and 4 in. apart. Protect in winter by a layer of cinder ashes. Lift and replant only when bulbs show signs of deterioration.

PROPAGATION: By offsets.

SPECIES CULTIVATED: *H. Andersonii* (syn. *Zephyranthes Andersonii*), golden yellow, summer, 6 in., S. America; *brachyandrus* (syn. *Hippeastrum brachyandrum*), orchid-pink above, shading to dark reddish-purple below, to 12 in., S. America; *robustus*, rose-red, to 9 in., Argentina.

Hackberry, see *Celtis*.

Hacquetia—*Umbelliferae*. Hardy herbaceous perennial.

CULTURE: Soil, ordinary. Position, sunny rockery or margin of border. Plant in March.

PROPAGATION: By division of the roots in March.

SPECIES CULTIVATED: *H. Epipactis* (syn. *Dondia Epipactis*), yellow, spring, 3 to 6 in., Europe.

Haemanthus (Blood Lily; Red Cape Tulip)—*Amaryllidaceae*. Stove and greenhouse bulbous plants. First introduced early eighteenth century.

CULTURE: Compost, two parts sandy loam, one part peat, well-decayed manure and sand. Position, well-drained pots exposed to full sun in stove or greenhouse whilst growing; sunny shelf or frame whilst at rest. Pot early-flowering species Aug. to Nov.; late-flowering species March or April. Place bulbs half their depth in compost. Water very little till growth begins, then moderately; gradually withhold it when flowers fade, and keep soil quite dry from time foliage turns yellow till repotting time. Apply weak liquid manure once or twice weekly to

plants in flower. Temp., greenhouse species, Sept. to March 45° to 55°, March to Sept. 55° to 65°; stove species, Sept. to March 55° to 65°, March to Sept. 65° to 75°. Bulbs flower best when only repotted every three or four years.

PROPAGATION: By offsets removed at potting time and placed in small pots.

STOVE SPECIES CULTIVATED: *H. cinnabarinus*, red, April, 1 ft., S. Africa; *coccineus*, 'Blood Flower', scarlet, autumn, 1 ft., S. Africa; *multiflorus* (syn. *H. Kalbreyeri*), scarlet, April, 1 ft., S. Africa.

GREENHOUSE SPECIES CULTIVATED: *H. albiflos*, white, autumn, 1 ft., S. Africa, and var. *pubescens*; *Katharinae*, red, spring, 1 ft., S. Africa; *natalensis*, green, purple and yellow, Feb., 1 ft., S. Africa; *puniceus*, orange-scarlet, summer, 1 ft., S. Africa.

Hair Grass, see *Aira*.

Hakea—*Proteaceae*. Tender evergreen shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts fibrous loam, leaf-mould and sharp sand. Position, well-drained large pots, tubs or borders in unheated glasshouse, or sheltered borders in the open in the mildest parts of the country.

PROPAGATION: By cuttings of half-ripened wood in July under hand-light in slight bottom heat, or by seeds sown in sandy peat in temp. 60° in spring.

SPECIES CULTIVATED: *H. dactyloides*, white, July, 7 ft., Australia; *ferruginea*, creamy-white, May to June, 3 to 4 ft., Australia; *saligna*, white, spring, 6 to 8 ft., Australia; *suaveolens*, white, fragrant, summer, 10 ft., W. Australia.

Halesia (Silver Bell)—*Styracaceae*. Hardy flowering deciduous trees. First introduced mid-eighteenth century.

CULTURE: Soil, deep sandy loam. Position, sheltered borders, shrubberies or lawns. Plant, Oct. to Feb. Prune into shape after flowering.

PROPAGATION: By cuttings of roots inserted in sandy soil outdoors in March or Oct.; by layering shoots in Oct. or Nov., or by seeds sown in spring.

SPECIES CULTIVATED: *H. carolina* (syn. *H. tetraptera*), 'Snowdrop Tree', white, May, 15 to 20 ft., N. America; *diptera*, white, May, to 30 ft., N. America; *monticola*, similar to *H. carolina* but stronger growing and with larger flowers, N. America.

× **Halimiocistus**—*Cistaceae*. Hardy dwarf evergreen shrubs. Bigeneric hybrid between *Halimium* and *Cistus*.

CULTURE: Soil, dry, light. Position, full exposure to sun.

PROPAGATION: By cutting of half-ripened wood.

SPECIES CULTIVATED: *H. Inguersenianus*, white, 18 in., all summer, Portugal; *Sahucii*, white, 12 in., May to autumn.

Halimium—*Cistaceae*. Hardy evergreen shrubs, similar to *Helianthemum* and formerly included in that genus.

CULTURE: Soil, dry. Position, sunny. Subject to damage in severe winters.

PROPAGATION: By seed sown in heat in April; cuttings in sandy soil in frames in August.

SPECIES CULTIVATED: *H. alyssoides*, yellow, May to July, 2 ft., Spain and Portugal; *lasianthum* (syn. *H. formosum*), yellow, June, 3 to 4 ft., Portugal; *halimifolium*, yellow, May to June, 2 to 3 ft., S. Europe; *ocymoides* (syn. *Helianthemum ocymoides*), flowers bright yellow with maroon blotch, erect growing to 3 ft., young shoots downy, summer, Spain and Portugal.

Halimodendron (Salt Tree)—*Leguminosae*. Hardy deciduous flowering shrub. First introduced mid-eighteenth century.

CULTURE: Soil, deep sandy. Position, shrubberies and open borders. Plant, Oct. to Feb. Prune into shape in Nov.

PROPAGATION: By seeds outdoors in March or April; grafting on to stocks of *caragana*, to which it is related, in spring.

SPECIES CULTIVATED: *H. halodendron* (syn. *H. argenteum*), grey-spined leaves and pink pea-shaped flowers, a good maritime shrub, June to July, 4 to 6 ft., Siberia.

Hamamelis (Wych-Hazel)—*Hamamelidaceae*. Hardy winter and early spring flowering deciduous shrubs. First introduced early eighteenth century.

CULTURE: Soil, deep, rich loam. Position, as lawn specimens or in shrubberies where they can have plenty of space, being open habited.

PROPAGATION: By layering in Oct. or Nov.; grafting rare species on stocks of *H. virginiana*, which is raised from seed, in April.

SPECIES CULTIVATED: *H. japonica*, lemon yellow, Dec. to Feb., 12 ft., Japan, and vars. *arborea* and *Zuccariniana*; *mollis*, yellow, Jan. and Feb., the best species with spicily fragrant flowers and autumn-tinted foliage, 10 ft., China; *virginiana*, yellow, Dec. to Feb., N. America.

Hard Fern, see *Blechnum spicant*.

Hardenbergia (Australian Sarsaparilla-tree)—*Leguminosae*. Greenhouse flowering evergreen twining plants. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam and peat, little silver sand. Position, pots, with shoots trained to trellis, or planted out in beds, and shoots trained up rafters. Pot or plant, Feb. or May. Water freely March to Sept., moderately at other times. Prune straggling plants into shape in Feb. Apply weak stimulants occasionally to healthy plants in flower. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in well-drained pots of light sandy soil in temp. of 55° to 65° in March or April; cuttings of firm young shoots, 2 to 3 in. long, inserted in well-drained pots of sandy peat under bell-glass in temp. 55° to 65°, March to July.

SPECIES CULTIVATED: *H. Comptoniana*, purple, March, 10 ft., S. Australia; *violacea* (syns. *H. monophylla*, *H. bimaculata*), 'Australian Lilac', purple, April, 8 to 10 ft., S. Australia, and var. *rosea*.

Harebell, see *Campanula rotundifolia*.

Hare's-foot Fern, see *Davallia canariensis*.

Hare's-tail Grass, see *Lagurus ovatus*.

Haricot Bean, see *Phaseolus vulgaris*.

Hart's-tongue Fern, see *Phyllitis Scolopendrium*.

Hartwegia—*Orchidaceae*. About five small epiphytic species. Pseudo-bulbs stem-like, terminating in a spike of small bright flowers. Leaf single, persistent.

CULTURE: Compost, temps. as for Cattleyas. Requires a rest but not severe. Position, pans hung near the glass.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *H. gemma*, amethyst-purple, summer, autumn, Cent. America; *purpurea*, rose-purple, summer, autumn, Guatemala, Mexico.

Hatchet Cactus, see *Pelecypora aseliiformis*.

Hautbois Strawberry, see *Fragaria moschata*.

Hawkweed, see *Hieracium*.

Hawk's Beard, see *Crepis aurea*.

Haworthia—*Liliaceae*. Low succulent greenhouse plants with or without a short stem. Leaves in rosettes or overlapping, arranged in several rows, short, blunt, pointed or even truncate, fleshy, often covered with pearly tubercles or even more or less transparent. Flowers in long loose racemes, small and inconspicuous, whitish-green. Flowering almost any time. Attractive easily-grown little succulents suitable for room culture.

CULTURE: Soil, well drained, rich, sandy. Position, room or cool house, winter

temp. not above 55°. Rather liable to sunburn. Water freely in summer, less in winter but should not be dried out for too long.

PROPAGATION: By offshoots. May easily be raised from seed but not recommended on account of hybridisation.

SPECIES CULTIVATED: *H. arachnoides* (syn. *Aloe arachnoidea*), stemless rosettes, oblong leaves with bristly tip, Cape; *cymbiformis*, rosettes stemless making offsets freely, leaves 1½ to 2 in., S. Africa; *herbacea* (syn. *H. atrovirens*), stemless rosettes forming clumps, S. Africa; *marginata* (syn. *H. albicans*), leaves 3 to 4 in., S. Africa; *margaritifera*, stemless rosettes making many offsets, leaves 3 in. long with large roundish pearly tubercles, S. Africa; *Reinwardtii*, rosettes elongated, leaves to 1½ in. long, upper side with a few tubercles, beautiful species, S. Africa; *tortuosa*, rosette elongated to 5 in., stems branching from the base leaves in three spiral overlapping rows, S. Africa; *viscosa*, rosette to 8 in. long, leaves in three rows, overlapping, erect, S. Africa.

Hawthorn, see *Crataegus Oxyacantha*; **Water-**, see *Aponogeton distachyus*.

Hazelnut, see *Corylus Avellina*.

Heartsease, see *Viola tricolor*.

Heath, see *Erica*.

Heather, see *Calluna*.

Heavenly Bamboo, see *Nandina domestica*.

Hebe—*Scrophulariaceae*. Slightly tender and hardy evergreen flowering shrubs from New Zealand. Formerly included in *Veronica*.

CULTURE: Soil, ordinary, or loam and peat. Position, sunny rockeries, borders or beds near the sea coast or in inland sheltered districts south of the Trent. Plant, Sept. or April, prune straggly plants into shape in April.

PROPAGATION: Cuttings of young growth inserted in sandy soil under a bell-glass in June or July; cuttings of nearly ripened growth under hand-light or in cold frame in summer.

SPECIES CULTIVATED: *H. amplexicaulis*, white, July to Aug., 1 to 3 ft.; *Andersonii variegata*, foliage margined with white, 2 to 3 ft., hybrid; *angustifolia*, white, July to Sept.; *anomala*, white or pale pink, July to Aug., 3 to 5 ft.; *Bidwillii*, white veined pink, summer, 6 in.; *Buchananii*, white, July to Aug., 1 ft.; *buxifolia*, white, 9 to 12 in., summer; *carnosula*, white, July to Aug., 1 to 3 ft.; *catarractae*, white and pink, summer, 6 to 9 in.; *chathamica*, purple, summer, 1 to 1½ ft.; *Colensoi*, white, July to Aug., 1 to 1½ ft.; *cupressoides*, pale blue, summer, 1 to 6 ft.; *Darwiniana*, white, July to Aug., 2 to 3 ft.; *decumbens*, white, July to Aug., to 3 ft.; *diosmaefolia*, white or pale blue, July to Aug., to 5 ft.; *elliptica*, white, summer, to 20 ft.; *epacridea*, white, 4 to 6 in., summer; *Hectori*, white or pink, July to Aug., 6 to 12 in.; *Hookeriana*, white, summer, 8 to 12 in.; *Hulkeana*, lilac, 4 to 6 ft.; *Lewisii*, pale blue, summer, 4 to 6 ft.; *loganioides*, white, July to Aug., 4 to 12 in.; *lycopodioides*, white, July, 1 to 2 ft.; *macrantha*, large white flowers, 12 to 15 in., June to July; *pimeleoides*, purplish-blue, June to Aug., 1 to 1½ ft.; *pinguifolia*, white, July to Aug., 1 to 3 ft.; *salicifolia*, white, summer, 6 to 10 ft.; *speciosa*, reddish-purple, July to Sept., to 5 ft.; *Traversii*, white, summer, 4 to 6 ft.; *tetrasticha*, white, 9 in., summer; *vernica*, white, June to Aug., 1 to 2 ft.

Hebenstretia—*Scrophulariaceae*. Half-hardy perennial treated as an annual.

CULTURE: Soil, good ordinary. Position, sunny borders. Sow seeds in heat in March, harden seedlings off early in May, and plant out late in May, 12 to 18 in. apart in groups. Seeds may also be sown thinly where required to flower, about the middle of April.

SPECIES CULTIVATED: *H. comosa*, white with tinge of orange, summer, 2 to 3 ft., S. Africa.

Hedera (Ivy)—*Araliaceae*. Hardy evergreen climbing shrubs with insignificant

green flowers followed by purplish-black, orange or yellow berries. Tree Ivies represent the adult stage of growth of many kinds; the climbing habit is lost and a large, rounded, free-flowering bush is formed. The types usually grown are *H. Helix arborescens*, 'Common Tree Ivy', and *H. colchica arborescens*, the best large-leaved tree ivy.

CULTURE: Soil, ordinary. Position, against walls of all aspects, railings, tree stumps, arbours, etc., on banks and under shade of trees. Plant, Sept. to Nov., or Feb. to April. Peg shoots to surface of soil when first planted in any position. Prune, April, cutting off old leaves and straggling shoots. Apply stimulants if vigorous growth is desired.

POT CULTURE: Compost, two parts loam, one part leaf-mould or decayed manure and sand. Position, well-drained pots in unheated greenhouse, balcony or window. Pot, Oct. or March. Water moderately Oct. to March, freely afterwards. Prune into shape, April. Apply stimulants to established plants in summer.

PROPAGATION: By cuttings of firm shoots 6 to 8 in. long in ordinary soil at base of north wall or fence, Sept. to Nov.; in well-drained pots in cold frame in Oct., or in temp. 55° to 65° Sept. to Nov.; tree and variegated kinds by cleft grafting on common species in temp. 55° in Feb.

SPECIES CULTIVATED: *H. canariensis*, large leathery leaves to 8 in. across, Canary Is., N. Africa, and var. *variegata*; *colchica*, largest-leaved of all ivies up to 10 in. across, Caucasus, Persia, and var. *dentata variegata*, attractively mottled and streaked with gold; *Helix*, 'Common Ivy', Europe, including Britain, usually represented in gardens by improved vars. *arborescens*, shrubby, *hibernica*, 'Irish Ivy', coarse and vigorous, good for shade under trees.

Hedge Hyssop, see *Hydrotrida*.

Hedgehog Cactus, see *Ferocactus*; **-Holly**, see *Ilex Aquifolium ferox*.

Hedychium (Ginger Lily)—*Zingiberaceae*. Stove and greenhouse herbaceous perennials with fragrant flowers. First introduced late eighteenth century.

CULTURE: Compost, two parts peat, one part loam, one part sand. Position, well-drained pots, tubs or boxes, or planted in beds in stove or warm greenhouse. Pot plants may be stood outdoors July to Aug. Pot, March or April. Water freely April to Nov., occasionally other times. Apply liquid manure twice a week to plants in flower. Temp., stove species, March to Nov. 65° to 75°, Nov. to March 50° to 55°; greenhouse species, March to Nov. 55° to 65°, Nov. to March 45° to 50°. Cut down flower stems immediately after flowering. *H. Gardnerianum* suitable for outdoor culture in summer. Plant, May, in rich soil. Water freely in dry weather. Apply liquid manure when in flower. Lift roots in Oct. and store in frost-proof place till planting time.

PROPAGATION: By division of rhizomes in March or April.

STOVE SPECIES CULTIVATED: *H. coronarium*, 'Fragrant Garland Flower', white, summer, 5 ft., India.

GREENHOUSE SPECIES CULTIVATED: *H. flavum*, yellow and orange, July, 5 ft., Himalaya; *Gardnerianum*, lemon-yellow, summer, 4 ft., Himalaya; *Greeni*, red, summer, 6 ft., Himalaya.

Hedysarum—*Leguminosae*. Hardy perennials or sub-shrubs with pea-shaped flowers. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, sunny rockeries, banks, etc., for dwarf species; sunny well-drained borders for tall kinds. Plant, Oct., March or April.

PROPAGATION: By seeds sown outdoors in April, transplanting to final position in June; division in Oct. or April; sub-shrubby kinds by layering in spring or cuttings in August.

SPECIES CULTIVATED: *H. coronarium*, 'French Honeysuckle', red, summer, 3 to 4 ft., S. Europe, var. *album*, white; *microcalyx*, crimson-violet, June to July, 2 to 3 ft., Himalaya; *multijugum*, magenta, all summer, 4 ft., shrubby, Mongolia, and var. *apiculatum*; *obscurum*, crimson, summer, 6 to 12 in., Europe.

Hedyscepe—*Palmae*. Stove palm with feather-like leaves. A good room plant.

CULTURE: Compost, equal parts loam and peat, little silver sand. Position, well-drained pots in shady plant stove. Pot, Feb., March or April. Water freely March to Oct., moderately afterwards. Syringe twice daily March to Sept. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 65°.

PROPAGATION: By seeds sown 1 in. deep in light soil, in temp. 70° to 80°, in Feb. or March.

SPECIES CULTIVATED: *H. Canterburyana* (syn. *Kentia Canterburyana*), Lord Howe's Island.

Helenium (Sneezeweed)—*Compositae*. Hardy herbaceous perennials and annuals. First introduced early eighteenth century.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary rich. Position, sunny well-drained borders. Plant, Oct., Nov., March or April. Cut down flower stems in Oct.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in April, transplanting seedlings in June or July; division of roots in Oct. or March.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny borders. Sow seeds in patches in borders in March or April.

PERENNIAL SPECIES CULTIVATED: *H. autumnale*, yellow, July to Oct., 3 to 5 ft., N. America, and vars. *pumilum*, 1 ft., *striatum*, yellow and brown, 4 ft.; *Bigelovii*, yellow and brown, Aug. to Oct., 4 ft., California; *Bolanderi*, yellow and brown, summer, 18 in., California; *Hoopesii*, yellow, summer, 2 ft., N. America. There are several named vars.

ANNUAL SPECIES CULTIVATED: *H. tenuifolium*, yellow, summer, 1½ to 2 ft., N. America.

Helianthemum (Sun Rose)—*Cistaceae*. Hardy flowering evergreen shrubs. A number of the species are now referred to *Halimium*.

CULTURE: Soil, light sandy. Position, sunny banks or rockeries. Plant, Oct., March or April. Prune into shape in March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil outdoors in April; cuttings of shoots 1 to 2 in. long inserted in well-drained pots of sandy soil in cold frame Aug. or Sept.; division of plants Oct. or April.

SPECIES CULTIVATED: *H. apenninum*, white, summer, to 15 in., Europe, Asia Minor; *guttatum*, yellow with red spot at base, 6 in., Medit.; *nummularium* (syn. *H. vulgare*), yellow, June, trailing, and numerous double and single vars.; *Tuberaria* (syn. *Tuberaria vulgaris*), yellow, summer, trailing, S. Europe.

Helianthus (Sunflower)—*Compositae*. Hardy annual or perennial herbs; tubers of Jerusalem Artichoke edible.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny borders. Sow seeds $\frac{1}{4}$ in. deep in April where plants are to flower, or in pots in temp. 55° to 65° in April, transplanting seedlings outdoors in June. Apply stimulants occasionally when flower buds form.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary rich. Position, sunny well-drained borders. Plant, Oct., Nov. or April. Cut down flower stems in Oct. Water in dry weather. Apply stimulants occasionally when plants show flower buds. Replant every third year.

CULTURE OF JERUSALEM ARTICHOKE: Soil, ordinary rich. Position, open or shady. Plant, Feb. or March, placing tubers 6 in. deep and 12 in. apart in rows 3 ft. asunder. Earth up when stems are 6 in. high. Lift tubers in Nov. and store in sand or dry soil in outhouse, or leave in ground and dig as required.

PROPAGATION: Annual and perennial species by seeds sown $\frac{1}{4}$ in. deep in sunny place outdoors in March or April; perennials by division of roots, Oct., March or April; Jerusalem Artichoke, by tubers treated as above.

ANNUAL SPECIES CULTIVATED: *H. annuus*, 'Common Sunflower', yellow, summer, 6 to 10 ft., N. America; *argophyllus*, yellow, 6 ft., N. America; *debilis* (syn. *H. cucumerifolius*), yellow, 3 to 4 ft.

PERENNIAL SPECIES CULTIVATED: *H. atrorubens*, yellow, disk purple, Aug. to Sept., 5 to 6 ft., N. America; *decapetalus*, sulphur yellow, summer, 4 to 6 ft., Canada, and vars. *grandiflorus*, double, *maximus*, large; *doronicoides*, yellow, summer, 7 ft., roots tuberous, N. America; *laetiflorus*, yellow, autumn, 5 to 7 ft., N. America; *rigidus* (syn. *Harpalium rigidum*), yellow, Aug., 5 ft., N. America; *salicifolius* (syn. *H. orgyalis*), yellow, Aug., 6 ft., N. America; *tuberosus*, 'Jerusalem Artichoke', yellow, 6 ft., N. America. There are numerous sunflower vars. to be found in trade lists.

Helichrysum (Everlasting-flower; Immortelle-flower)—*Compositae*. Half-hardy annuals, hardy perennials and greenhouse shrubs.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position sunny. Sow seeds in gentle heat in March and plant out in May; or sow outdoors in April. Gather flowers for winter decoration directly they are fully expanded.

CULTURE OF PERENNIAL SPECIES: Soil, rich loam. Position, sunny well-drained borders and rock gardens. Plant, March or April.

CULTURE OF HARDY SHRUBBY SPECIES: Soil, rich loam. Position, sunny well-drained borders or sheltered shrubberies. Plant, Sept. or Oct. Protect in very severe weather.

PROPAGATION: Hardy species by seeds sown outdoors in April or cuttings in cold frame in spring; greenhouse species by cuttings in fine sand under bell-glass in spring; shrubby species by cuttings of half-ripened wood in frame in Aug.

ANNUAL SPECIES CULTIVATED: *H. bracteatum*, colours various, summer, 3 to 4 ft., Australia.

PERENNIAL SPECIES CULTIVATED: *H. angustifolium*, white, summer, to 1 ft., Medit. Region; *arenarium*, 'Yellow Everlasting', yellow, summer, 6 to 12 in., Europe; *bellidioides*, silvery white, summer, 3 to 4 in., New Zealand; *lanatum*, yellow, summer, to 15 in., S. Africa.

HARDY SHRUBBY SPECIES CULTIVATED: *H. diosmifolium* (syn. *Ozothamnus rosmarinifolium*), white, summer, 6 to 9 ft., Tasmania.

Helicodiceros (Dragon's Mouth)—*Araceae*. Hardy tuberous-rooted perennial. Flowers, arum-like, with an unpleasant odour.

CULTURE: Soil, ordinary, well drained. Position, sunny borders. Plant in autumn or early spring.

PROPAGATION: By offsets in autumn.

SPECIES CULTIVATED: *H. muscivorus* (syn. *Arum crinitum*), spathe purplish-brown, summer, 2 ft., S. Europe.

Heliconia (False Plantain)—*Musaceae*. Stove herbaceous perennials. Leaves, green and stem striped with black, green and yellow. First introduced late eighteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould, peat and sand. Position, pots in shady part of plant stove. Pot, Feb. or March. Water freely March to Sept., moderately Sept. to Nov., none Nov. to March. Syringe daily March to Sept. Temp., Feb. to Sept. 65° to 75°, Sept. to Nov. 60° to 70°, Nov. to Feb. 55° to 65°.

PROPAGATION: By division of roots in Feb. or March.

SPECIES CULTIVATED: *H. angustifolia* (syn. *H. bicolor*), flowers white and green, spathes scarlet, 3 ft., Brazil; *aureo-striata*, green and yellow leaves, 3 ft., New Guinea; *illustris*, green and red leaves, 3 ft., South Sea Islands; *Sanderi*, variegated, 2 ft., New Guinea; *triumphans*, green and black striped leaves, 3 ft., Trop. America.

Heliophila—*Cruciferae*. Hardy annuals. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, sunny well-drained borders. Water in dry weather.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pans or boxes of light soil in temp.

55° in March, transplanting seedlings outdoors end of May, or similar depth in April where plants are to flower.

SPECIES CULTIVATED: *H. linearifolia*, blue, 18 to 24 in., S Africa.

Heliopsis—*Compositae*. Hardy, herbaceous, sunflower-like perennials. First introduced early eighteenth century.

CULTURE: Soil, ordinary rich. Position, sunny well-drained borders. Plant, Oct., Nov., March or April. Cut down flower stems in Oct. Water in dry weather. Apply stimulants occasionally when plants show flower buds.

PROPAGATION: By division of plants, Oct., March or April.

SPECIES CULTIVATED: *H. helianthoides* (syn. *H. laevis*), 'North American Ox-eye', yellow, autumn, 5 ft., N. America, perennial, and var. *Pitcheriana*; *scabra*, yellow, July to Sept., 4 ft., U.S.A., and vars. *magnifica*, *major*, *incomparabilis*, *patula*, and *zinniaeflora*.

Heliosperma, see *Silene*.

Heliotropium (Heliotrope)—*Boraginaceae*. Greenhouse fragrant flowering shrub. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts light loam, leaf-mould and sand. Position, pots or beds, with shoots growing loosely or trained to trellis, walls, pillars, or rafters in greenhouse; in sunny beds outdoors June to Sept., or in pots in windows. Pot, Feb. to May. Plant outdoors, June. Lift and repot, Sept. Water freely March to Oct., moderately afterwards. Apply liquid or artificial manure to healthy plants in flower. Prune old plants closely in Feb. Training: Nip off points of main, also lateral shoots when 3 in. long to form dwarf plants; points of main shoots when 12 in. long, and side shoots when 3 to 6 in. long, to form pyramids; points of main shoots when 2 ft. long, and of lateral shoots at apex when 3 to 6 in. long—all side shoots to within 4 in. of apex to be removed altogether—to form standards. Temp., Feb. to Oct. 60° to 70°, Oct. to Feb. 50° to 55°. Pot plants do best in cold frame or sunny position outdoors July and Aug.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots or pans of light soil in temp. 65° to 75° in March; by cuttings of shoots 2 to 3 in. long inserted in pots of sandy soil under bell-glass, or in propagator in temp. 65° to 75° in March, April, Aug. or Sept.

SPECIES CULTIVATED: *H. amplexicaulis* (syn. *H. anchusaefolium*), lavender, 1 ft., summer, Peru; *arborescens* (syn. *H. peruvianum*), 'Cherry Pie', blue and white, spring to winter, 1 to 6 ft., Peru, and numerous vars.

Helipterum (Australian Everlasting: Immortelle-flower)—*Compositae*. Hardy annuals. First introduced mid-nineteenth century.

CULTURE OF *H. HUMBOLDTIANUM*: Soil, light rich. Position, sunny well-drained borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of light soil, in temp. 55° in March, transplanting seedlings outdoors end of May or early in June.

CULTURE OF *H. MANGLESII* AND *H. ROSEUM*: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in light sandy soil in temp. 55° to 65° in March or April, harden off in May, and plant out in June. Gather blooms when fully grown and dry thoroughly in summer for winter decorations.

POT CULTURE: Compost, any good well-drained soil. Sow seeds thinly in pots in temp. 50° in Sept. for spring flowering, and in March for summer blooming. Water moderately at first, freely later on. Apply weak stimulants once a week when seedlings are 6 in. high. Support with neat stakes when 3 to 6 in. high. No shade required. Winter temp., 45° to 55°.

SPECIES CULTIVATED: *H. Humboldtianum* (syn. *H. Sandfordii*), yellow, summer, 1 ft., Australia; *Manglesii* (syn. *Rhodanthe Manglesii*), rosy pink and yellow, summer, 12 to 18 in., Australia; *roseum* (syn. *Acroclinium roseum*), rose, summer, 2 ft., Australia.

Hellebore, see *Helleborus*.

Helleborine see *Epipactis latifolia*.

Helleborus (Hellebore)—*Ranunculaceae*. Hardy evergreen and deciduous perennials with thick fibrous roots.

OUTDOOR CULTURE: Soil, rich loamy. Position, shady well-drained east border. Plant, Oct., Nov. and March, 12 in. apart. Mulch with well-decayed manure in April. Water freely in dry weather. Apply liquid manure occasionally May to Sept. Disturb roots as little as possible. Protect with hand-lights, cloches or frames, or cover surface of bed with moss when in bloom. Manure freely prior to planting.

POT CULTURE: Compost, two parts fibrous loam, one part decayed manure. Position, cold frame, or greenhouse heated to temp. 40° to 50°. Pot, Oct. Lift fresh plants annually for pot culture, replanting old ones outdoors in April or May. Water moderately. Size of pot for single plants, 6 to 8 in.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shallow boxes of sandy soil in cold frame Oct. or March, transplanting seedlings outdoors when a year old; by division of roots in March.

SPECIES CULTIVATED: *H. abchasicus*, purplish-green, Jan. to March, 1 ft., Caucasus; *antiquorum*, rose-pink, Feb. to April, 1½ ft., Caucasian Region; *caucasicus*, pale green, Feb. to April, 2 ft., Caucasus; *colchicus*, deep purple, Jan. to March, 1½ ft., Asia Minor; *cyclophyllus*, 1 ft., green, E. Medit. Region; *foetidus*, 'Stinking Hellebore', green and purple, Feb., 2 to 3 ft., Britain; *guttatus*, white and crimson, Jan. to April, 1½ ft., Caucasus; *lividus*, green, March, 2 ft., Corsica; *multifidus*, 1 ft., much divided leaves, green, Balkans; *niger*, 'Christmas Rose', white, winter, 6 to 15 in., Europe, and vars. *altifolius*, white and purple, *angustifolius*, white, and *major*, white; *odorus*, 'Fragrant Hellebore', green, March, 1½ ft., Hungary; *olympicus*, purple, Feb. to April, 1 to 2 ft., Greece; *orientalis*, 'Lenten Rose', rose, Feb. to May, 1 to 2 ft., Greece; *vesicarius*, 1 ft., greenish, inflated fruits, N. Syria; *viridis*, 'Green Hellebore', green, March, 1½ ft., Europe. Many vars. will be found in trade lists.

Helmet or Bucket Orchid, see *Coryanthes*.

Helonias (Stud-flower)—*Liliaceae*. Hardy tuberous-rooted perennial. First introduced mid-eighteenth century.

CULTURE: Soil, sandy loam and peat. Position, moist, shady borders or margins of lakes or ponds. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in a well-drained pan of sandy peat in cold shady frame in March or April; division of roots, Oct. or March.

SPECIES CULTIVATED: *H. bullata*, 'Swamp Pink', purplish-rose, summer, 18 in. N. America. See also *Zygadenus*.

Helxine (Baby's Tears)—*Urticaceae*. Hardy perennial with creeping or trailing shoots.

CULTURE: Soil, ordinary, mixed with a little leaf-mould and sand. Position, in pots suspended in windows or as edgings to beds, or carpeting small beds on rockery in sun or shade. Pot in spring, or plant out in May. Water moderately those grown in pots.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *H. Solierolii*, 2 to 3 in., tiny neat green leaves, very invasive, Corsica.

Hemerocallis (Day Lily)—*Liliaceae*. Hardy herbaceous perennials. First introduced late sixteenth century.

CULTURE: Soil, ordinary deep rich. Position, moist borders, open or slightly shady. Plant, Oct., March or April, singly or in groups. Lift and replant only when they become unhealthy. Mulch established clumps with decayed manure in April or May.

PROPAGATION: By division of roots, Oct. or March.

SPECIES CULTIVATED: *H. aurantiaca major*, 'Japanese Day Lily', apricot,

summer, 3 ft., Japan; *Dumortieri*, orange-yellow, July, 2 ft., Japan; *flava*, orange-yellow, fragrant, July, 2 to 3 ft., S. Europe; *fulva*, yellow, June, 2 to 3 ft., Europe and Japan, and vars. *Kwanso*, double flowered, *longituba*, and *rosea*; *Middendorffii*, golden yellow, summer, 2 ft., Siberia and Japan; *minor* (syn. *H. graminea*), yellow, fragrant, 8 in., Siberia and Japan; *Thunbergii*, yellow, July, fragrant, 2 ft., Japan. There are also many fine hybrids.

Hemionitis—*Polypodiaceae*. Warm greenhouse evergreen ferns. Fronds heart- or hand-shaped. First introduced late eighteenth century.

CULTURE: Compost, two parts peat, one part sand. Position, small well-drained pots in shade. Pot, Feb. or March. Water moderately March to Sept., occasionally other times. Syringing not required. Temp., March to Sept. 60° to 70°, Sept. to March 55° to 60°.

PROPAGATION: By spores sown on surface of pans of sandy peat under bell-glass in temp. 65° to 75° at any time.

SPECIES CULTIVATED: *H. arifolia* (syn. *H. cordata*), 6 in., Ceylon, etc.; *palmata*, 8 in., W. Indies.

Hemiptelia—*Cyatheaceae*. Stove and greenhouse evergreen tree ferns with feather-shaped fronds. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Position, well-drained pots or tubs in shade. Pot, March. Water freely March to Sept., moderately afterwards. Syringe trunks daily March to Sept. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°, for stove species; Sept. to March 45° to 55°, March to Sept. 55° to 65°, for greenhouse species.

PROPAGATION: By spores sown at any time on surface of finely sifted loam and peat in shallow well-drained pans under bell-glass in moist, shady position in temp. 75° to 85°.

STOVE SPECIES CULTIVATED: *H. horrida*, 6 to 10 ft., W. Indies.

GREENHOUSE SPECIES CULTIVATED: *H. capensis*, 6 to 10 ft., S. Africa; *Smithii*, 'Smith's Tree Fern', 10 to 12 ft., New Zealand; *Walkeræ*, 4 to 6 ft., Ceylon.

Hemlock, see *Tsuga*; **-Spruce**, see *Tsuga*.

Hemp, see *Cannabis sativa*; **-Agrimony**, see *Eupatorium cannabinum*.

Hepatica—*Ranunculaceae*. Hardy perennial herbs, sometimes included in the genus *Anemone*.

CULTURE: Soil, rich, well drained. Position, thin woodland, useful for colonising.

PROPAGATION: By seeds; division of roots.

SPECIES CULTIVATED: *H. americana* (syn. *Anemone Hepatica*), blue, Feb. to March, 6 in., Europe, N. America; *transsilvanica* (syn. *Anemone transsilvanica*), rose, spring, 3 to 5 in., Hungary, Romania, and various colour forms.

Heracleum (Cow Parsnip)—*Umbelliferae*. Coarse hardy perennial herbs with large, feather-shaped, green leaves.

CULTURE: Soil, ordinary. Position, open or sheltered shrubberies, borders, margins of ponds, lakes, etc. Plant, Oct. or Nov. Remove flower stems immediately they appear early in June if fine, healthy foliage is desired.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in ordinary soil outdoors, March or April; division of roots, Oct. or March.

SPECIES CULTIVATED: *H. Mantegazzianum*, white, summer, very large leaves, 7 to 9 ft., Caucasus; *villosum* (syn. *H. giganteum*), 'Cartwheel Flower', white and yellow, summer, 10 to 12 ft., Caucasus.

Herb Christopher, see *Actaea spicata*; **-of-Grace**, see *Ruta graveolens*; **-Paris**, see *Paris quadrifolia*; **-Patience**, see *Rumex Patientia*; **-Robert**, see *Geranium Robertianum*.

Hercules' Club, see *Aralia spinosa* and *Zanthoxylum Clava-Herculis*.

Herminium (Musk Orchis)—*Orchidaceae*. Hardy terrestrial orchid with musk-scented flowers.

CULTURE: Soil, light turfy loam with plenty of chalk or old mortar and leaf-mould added. Position, sunny rockeries, or in pots in cold frame. Plant wild roots directly flowers have faded, pot-grown roots in early spring.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *H. monorchis*, green and yellow, July, 6 in., Britain.

Hermodactylus (Snakeshead Iris)—*Iridaceae*. One tuberous species closely allied to *Iris*.

CULTURE: As tuberous iris.

PROPAGATION: By seed; division.

SPECIES CULTIVATED: *H. tuberosus* (syn. *Iris tuberosa*), violet, black and green, March, 9 to 12 in., Medit.

Herniaria (Rupture-wort)—*Illecebraceae*. Hardy perennial trailing herbs.

CULTURE: Soil, ordinary. Position, sunny or shady rockeries, or as edgings to carpet-beds, or for carpeting surfaces of beds containing choice bulbs. Plant, Oct., Nov., March to June.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light sandy soil outdoors, March or April; division of plants, Oct., Nov., March, April or May.

SPECIES CULTIVATED: *H. glabra*, leaves dark green, 1 in., Europe (Br.), var. *aurca*, leaves golden; *hirsuta*, leaves hairy, prostrate, Europe.

Heron's Bill, see *Erodium*.

Herpetospermum—*Cucurbitaceae*. Half-hardy annual climbing plants.

CULTURE: As for *Cucurbita*.

PROPAGATION: As for *Cucurbita*.

SPECIES CULTIVATED: *H. pedunculatum*, yellow, summer, N. India.

Hesperantha (Evening-flower)—*Iridaceae*. Greenhouse bulbous flowering plants with fragrant flowers opening in the evening. First introduced late eighteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould or decayed cow manure, and little sand. Position, well-drained pots in cold frame, cool greenhouse or window till growth begins, then remove to temp. 45° to 55°. Pot, Nov., placing five bulbs 3 in. deep in a 5 in. pot. Cover pots with coconut-fibre refuse or cinder ashes till growth begins. Water moderately from time growth commences till flowers fade, then gradually withhold, keeping bulbs quite dry from Sept. to Jan.

PROPAGATION: By offsets treated as advised for bulbs.

SPECIES CULTIVATED: *H. cinnamomea*, white, April and May, 6 in.; *falcata*, brown and white, May, 10 in.; *pilosa*, white and red, April, 6 in.; *radiata*, white and red, May, 6 in.

Hesperis—*Cruciferae*. Hardy perennial and biennial herbs with fragrant flowers. First introduced late sixteenth century.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary rich moist. Position, sunny beds or borders. Plant, Oct., Nov., March or April. Mulch with decayed manure in May. Apply liquid manure occasionally in summer to double varieties. Cut down flower stems in Oct. Lift and replant double kinds every second year.

PROPAGATION: Single kinds by seeds sown $\frac{1}{4}$ in. deep in sunny position outdoors in April, transplanting seedlings in June or July; double kinds by cuttings of young shoots 3 in. long inserted in sandy soil in shady position outdoors, July to Sept., or under hand-light or in cold frame, Sept. or Oct., transplanting in March; also by division of roots, Oct. or March.

CULTURE OF BIENNIAL SPECIES: Soil, ordinary. Position, well-drained borders or old walls. Sow seeds where plants are to flower, in July thinning seedlings to 6 to 12 in.

PERENNIAL SPECIES CULTIVATED: *H. matronalis*, 'Sweet Rocket', 'Dame's

Violet', 'Dame's Rocket', white or lilac, May to July, 2 to 3 ft., S. Europe, and its double white and purple flowered vars.

BIENNIAL SPECIES CULTIVATED: *H. tristis*, white, cream or purplish, summer, 1 to 2 ft., S. Europe.

Hesperochiron—*Hydrophyllaceae*. Hardy herbaceous perennials.

CULTURE: Soil, sandy loam, deep and well drained. Position, sunny sheltered pocket in the rock garden.

PROPAGATION: By seeds sown in spring in soil as above.

SPECIES CULTIVATED: *H. californicus*, white, 6 to 9 in., summer, N. America; *pumilus*, white, pink or lavender, 4 to 6 in., summer, N. America.

Hesperoscordum, see *Brodiaea*.

Hessea—*Amaryllidaceae*. Greenhouse bulbous flowering plants. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy soil, one part leaf-mould or decayed cow manure, and little sand. Position, well-drained pots in cold frame, cool greenhouse, or window till growth begins, then remove to temp. 45° to 55°. Pot, Nov., placing five bulbs 3 in. deep in a 5 in. pot. Cover pots with peat or cinder ashes till growth begins. Water moderately from time growth commences till flowers fade, then gradually withhold, keeping bulbs quite dry till potting time. Repot annually. May be grown outdoors in sunny borders in the mildest parts of the country.

PROPAGATION: By offsets treated as bulbs.

SPECIES CULTIVATED: *H. crispa*, pink, summer, 3 in., S. Africa; *gemmata*, yellow, Aug., 10 in., S. Africa.

Heteranthera (Mud Plantain)—*Pontederiaceae*. Tender aquatics for indoor tanks or aquariums.

CULTURE: Soil, rich loam. Position, full sun in very shallow water. Plant, March to June.

PROPAGATION: Cuttings in shallow water or division during growing season.

SPECIES CULTIVATED: *H. graminea*, yellow, bronze growth, used in aquariums, S. America; *limosa*, blue or white, Trop. America; *reniformis*, scrambling growth, pale blue, S. and Trop. America; *zosterifolia*, aquarium oxygenator, blue flowers, S. America.

Heteromeles—*Rosaceae*. Slightly tender evergreen shrub. First introduced late eighteenth century.

CULTURE: Soil, well-drained open loam. Position, sheltered shrubberies or walls in mild districts. Large well-drained pots in cool greenhouse elsewhere.

PROPAGATION: By seeds sown in sandy soil in pans during Feb. in temp. 60° to 65°; cuttings of partially ripened shoots during July under bell-glass in gentle bottom heat; layers.

SPECIES CULTIVATED: *H. arbutifolia* (syn. *Photinia arbutifolia*), 'Christmas Berry', white, Aug., small red berries in clusters, seldom formed in this climate, 15 ft., California, var. *chrysocarpa*, yellow berries.

Heuchera (Alum-root)—*Saxifragaceae*. Hardy perennial herbs. *H. tiarelloides* is now *Heucherella tiarelloides*. First introduced mid-seventeenth century.

CULTURE: Soil, ordinary, light, rich or peaty; not suited for clay soils. Position, open sunny well-drained borders. Plant, Oct., Nov., March or April.

PROPAGATION: By division of roots or crowns, March to May; also by seeds sown in light soil in cold frames in spring, transplanting seedlings into small pots and planting out following spring.

SPECIES CULTIVATED: *H. americana*, red, summer, 18 in., N. America; *brizoides*, pink, summer, 1 ft., hybrid; *micrantha*, yellowish-white, summer, 2 ft., N. America; *pubescens*, pale red and yellow, summer, brown-mottled foliage, 2 to 3 ft., N. America; *sanguinea*, 'Coral Bells', red, summer, 12 to 18 in., Mexico. There are several vars. to be found in trade lists.

× **Heucherella**—*Saxifragaceae*. A bigeneric hybrid between *Heuchera* and *Tiarella*. Sometimes included in *Heuchera* and similar to *H. sanguinea*, but with stamens varying from 5 to 10. Hardy herbaceous perennials.

CULTURE: Soil, ordinary. Position, sun or half-shade. Plant, Oct., to Nov., or March to April.

PROPAGATION: By division.

SPECIES CULTIVATED: *H. alba*, white, leaves longer than broad, May to June, to 2 ft.; *tiarelloides* (syn. *Heuchera tiarelloides*), pink or red, bell-shaped, summer, 8 to 12 in.

Hibbertia—*Dilleniaceae*. Greenhouse evergreen flowering climbers. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam and peat, and little sand. Position, pots, tubs or beds; shoots trained up rafters. Pot or plant, Feb. or March. Prune straggling shoots, Feb. Water abundantly March to Sept., moderately afterwards. Temp., March to Oct. 55° to 75°, Oct. to March 45° to 55°.

PROPAGATION: By cuttings of moderately firm shoots to 3 in. long inserted in well-drained pots of sandy peat under bell-glass in temp. 55° to 65°, April to Aug.

SPECIES CULTIVATED: *H. dentata*, yellow, summer, trailing or twining, Australia; *perfoliata*, pale yellow, summer, trailing, Australia; *volubilis*, yellow, summer, strong climber, Australia.

Hibiscus (Rose Mallow)—*Malvaceae*. Stove evergreen and hardy deciduous flowering shrubs, hardy annuals and perennials. First introduced late sixteenth century.

CULTURE OF STOVE SPECIES: Compost, equal parts fibrous peat and loam, with charcoal and sand. Position, well-drained pots or beds with shoots trained to wall. Pot or plant, Feb. or March. Prune into shape, Feb. Water abundantly March to Oct., moderately afterwards. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°. *H. Manihot* makes a useful pot plant treated as a tender annual and grown in the greenhouse for summer flowering.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny beds or borders.

CULTURE OF SHRUBBY SPECIES: Soil, rich light loam. Position, sheltered, sunny, well-drained border. Plant, Oct. Prune after flowering, only thinning out weak and dead wood.

PROPAGATION: Stove species, by seeds in well-drained pots of sandy peat under bell-glass in temp. 75° in March; cuttings of firm shoots in sandy peat under bell-glass in temp. 75° in spring or summer; grafting in March. Perennial species, by seeds sown outdoors in April, or division of roots in March. Annual species, sow seeds of *H. Trionum* in April where plants are to flower, seeds of other annuals in well-drained pans during Feb. in temp. 60° to 65° and grow on in pots in greenhouse or planted outdoors in June. Shrubby species, by cuttings in sandy peat in cold frame in summer, or grafting in March.

STOVE SPECIES CULTIVATED: *H. Archeri*, hybrid between *H. schizopetalus* and *H. Rosa-sinensis*; *Cameronii*, rose, July, 4 to 5 ft., Madagascar; *coccineus*, scarlet, 10 ft., America; *Manihot*, with 6 in. yellow flowers with large blotch of maroon, 10 ft., Tropics; *Rosa-sinensis*, 'Blacking Plant', crimson, summer, to 25 ft., Asia; *schizopetalus*, orange-red, 10 ft., E. Trop. Africa.

ANNUAL SPECIES CULTIVATED: *H. diversifolius*, white with maroon centre, Africa, Australia, Pacific Isles; *esculentus*, 'Okra', 'Gumbo', yellow, to 6 ft., immature fruit used as a vegetable in America, Tropics; *Trionum* (syn. *H. africanus*), white with violet eye, 2 ft., Africa, N. America.

SHRUBBY SPECIES CULTIVATED: *H. syriacus* (syn. *Althaea frutex*), 'Shrubby *Althaea*', various colours, Aug. to Sept., to 10 ft., India and China, and many vars.

Hickory, see *Carya*.

Hidalgia—*Compositae*. Half-hardy climbing perennial. First introduced late nineteenth century.

OUTDOOR CULTURE: Raise plants from seed or cuttings in heat in spring and

plant out against a sunny trellis or arch late in May. Water freely, and feed with liquid manure when plants begin to bloom. Cut down shoots in Sept., lift roots, and place them in pots in a heated house to furnish cuttings in spring.

GREENHOUSE CULTURE: Grow in equal parts loam and leaf-mould, with plenty of sand. Water freely in spring and summer, little at other seasons. Train shoots up roof.

PROPAGATION: By cuttings of young shoots in spring.

SPECIES CULTIVATED: *H. Wercklei*, 'Climbing Dahlia', scarlet and yellow, summer, 12 to 15 ft., Costa Rica.

Hieracium (Hawkweed)—*Compositae*. Hardy perennial herbs.

CULTURE: Soil, ordinary. Position, sunny banks or elevated borders. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep outdoors in March or April; division of roots any time in spring.

SPECIES CULTIVATED: *H. aurantiacum*, orange-red, summer, 12 to 18 in., Cent. Europe, naturalised in Britain; *bombycinum*, yellow, silver leaves, 9 in., June, Europe; *brunneocroceum* (syn. *H. aurantiacum* hort.), brownish-orange, 9 to 18 in., Cent. Europe, naturalised in Britain; *villosum*, yellow, May to July, 1 ft., Europe.

Hierochloe (Holy Grass)—*Gramineae*. Hardy perennial grasses. Inflorescence chestnut-coloured, fragrant, borne in panicles; May to July.

CULTURE: Soil, ordinary. Position, damp, shady borders or margins of ponds. Plant, March or April.

PROPAGATION: By seeds sown in damp positions outdoors in spring; division of plants in March.

SPECIES CULTIVATED: *H. odorata* (syn. *H. borealis*), 1 to 2 ft., Europe (Br.).

Himalayan Honeysuckle, see *Leycesteria formosa*; **-Poppy**, see *Meconopsis betonicifolia*.

Himantoglossum—*Orchidaceae*. Hardy terrestrial orchid.

CULTURE: As Ophrys.

PROPAGATION: As Ophrys.

SPECIES CULTIVATED: *H. hircinum*, 'Lizard Orchid', green or greenish-white, lip with few red marks, goat-scented, summer, Europe, Britain, N. Africa.

Hindsia—*Rubiaceae*. Stove evergreen flowering shrubs. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts rough fibrous peat, light loam, silver sand and charcoal. Position, well-drained pots in light stove. Pot, Feb. or March. Water freely April to Sept., moderately afterwards. Prune into shape, Feb. Temp., Feb. to Aug. 65° to 75°, Aug. to Nov. 60° to 70°, Nov. to Feb. 55° to 65°.

PROPAGATION: By cuttings of firm shoots inserted in well-drained pots of pure silver sand under bell-glass in temp. 65° to 75° from March to June.

SPECIES CULTIVATED: *H. longiflora*, blue, summer, 2 to 3 ft., Brazil, and var. *alba*, white; *violacea*, violet blue, May, 3 ft., Brazil.

Hippeastrum—*Amaryllidaceae*. Stove bulbous plants, popularly known as Amaryllis. First introduced mid-seventeenth century.

CULTURE: Compost, two parts turfy loam, one part river sand and a few crushed bones. Position, well-drained pots in light part of stove. Pot, Jan., burying bulb about two-thirds of its depth. Water freely from time growth begins (about Feb.) until July, when keep quite dry. Apply liquid manure when flower spike shows. Top-dress large bulbs annually and repot every three or four years only. Temp., Feb. to Sept. 65° to 75°, Sept. to Feb. 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in well-drained pots of sandy loam in temp. 65° to 70° in March, placing seedlings singly in 2 in. pots and keeping them moderately moist all the year round for three years; by offsets treated as old bulbs. Seedlings are three years or so before they flower.

SPECIES CULTIVATED: *H. aulicum*, crimson and orange, winter, 2 ft., Brazil;

pardinum, green, yellow and scarlet, spring, 2 ft., Peru; *pratense*, scarlet, spring and early summer, Chile; *procerum*, bluish-mauve, 3 ft., spring, Brazil; *psittacinum*, orange and scarlet, summer, 2 ft., Brazil; *puniceum* (syn. *H. equestre*), 'Barbados Lily', red, summer, 18 in., Trop. America; *Reginae*, red and white, spring, 2 ft., S. America; *reticulatum*, rose or scarlet, spring, 1 ft., Brazil; *rutilum*, bright crimson and green, spring, 1 ft., S. Brazil; *vittatum*, crimson and white, spring, 2 ft., Peru. Numerous hybrids, more beautiful than the species, will be found in trade lists.

Hippocrepis—*Leguminosae*. Hardy evergreen trailing herb.

CULTURE: Soil, ordinary. Position, sunny rockeries or elevated borders. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in fine soil in sunny position outdoors in March or April; division of roots in March.

SPECIES CULTIVATED: *H. comosa*, 'Horseshoe Vetch', yellow, May to Aug., Europe, Africa.

Hippophae (Sea Buckthorn)—*Elaeagnaceae*. Hardy deciduous berry-bearing shrub. Male and female flowers borne on separate plants. Both must be grown to ensure a crop of berries.

CULTURE: Soil, ordinary. Position, open or shady shrubberies and inland or seaside gardens. Plant, Oct. to Feb.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep outdoors in Nov. or Dec.; by cuttings of roots inserted in Feb. or March in ordinary soil outdoors; layering shoots in autumn.

SPECIES CULTIVATED: *H. rhamnoides*, silver foliaged and partly spined shrub or small tree, most useful for seaside planting, but also highly ornamental in inland gardens for its long-persisting orange berries, to 20 ft., sometimes more, Europe, including Britain.

Hippuris (Mare's Tail)—*Haloragidaceae*. Hardy aquatic perennial. Leaves, narrow, strap-shaped; in circles round the stem.

CULTURE: Soil, mud. Position, bogs, ponds or damp places. Plant, March to June.

PROPAGATION: By division of roots, March.

SPECIES CULTIVATED: *H. vulgaris*, 8 to 12 in., Europe (Br.).

Hoffmannia—*Rubiaceae*. Warm greenhouse herbaceous perennials and shrubs. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts fibrous loam and leaf-mould, with liberal addition of sharp sand. Position, large well-drained pots in sunny greenhouse. Water freely during growing season, sparingly at other times. Temp., March to Sept. 60° to 70°, Sept. to March 55° to 60°.

PROPAGATION: By cuttings of young growth inserted in sandy soil in propagating frame with brisk bottom heat.

SPECIES CULTIVATED: *H. discolor*, red, foliage shining green above, purple beneath, 6 in., Mexico; *Ghiesbreghtii*, red and yellow, foliage velvety green above, purple beneath, 4 ft., Mexico, and var. *variegata*; *refulgens*, pale red, foliage green and red, reddish beneath, 1 to 2 ft., Mexico; *regalis*, yellow, foliage deep green above, purplish-red beneath, 1 ft., Mexico.

Hog Plum, see *Spondias Mombin*.

Hoheria—*Malvaceae*. Slightly tender flowering evergreen and deciduous shrubs.

CULTURE: Soil, rich, deep loam. Position, sheltered borders in favoured localities in the south and other districts.

PROPAGATION: By cuttings of half-ripened shoots in July in sandy soil with gentle bottom heat.

SPECIES CULTIVATED: *H. glabrata* (syns. *Gaya Lyallii* and *Plagianthus Lyallii*), tall shrub or small tree, 1 in., pure white fragrant flowers, deciduous, July, New Zealand; *populnea*, 30 ft., evergreen, fast growing, white, Sept. to Oct., New

Zealand; *sexstylosa* (syn. *H. populnea lanceolata*), similar to preceding, flowering freely in July to Aug., New Zealand.

Hoho, see *Pseudopanax chathamicum*.

Holboellia—*Berberidaceae* (or *Lardizabalaceae*). Cool greenhouse flowering evergreen climber. First introduced mid-nineteenth century.

CULTURE: Compost, two parts loam, one part of equal proportions of leaf-mould and silver sand. Position, large pots or tubs, shoots trained up roof. Prune away weak shoots in autumn. Water freely during spring and summer, moderately in winter. Syringe freely when not in flower. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°.

PROPAGATION: By cuttings inserted in sandy soil in gentle heat in spring.

SPECIES CULTIVATED: *H. latifolia* (syn. *Stauntonia latifolia*), white, fragrant, spring, 10 to 20 ft., Himalaya.

Holcus—*Gramineae*. Hardy ornamental perennial grass.

CULTURE: Soil, ordinary. Position, edgings to beds or borders, or in clumps in borders. Plant, Oct., March or April.

PROPAGATION: By division of plants in Oct., March or April.

SPECIES CULTIVATED: *H. lanatus*, 6 to 12 in., Britain.

Holly, see *Ilex*; **-Oak**, see *Quercus Ilex*.

Hollyhock, see *Althaea rosea*.

Holm Oak, see *Quercus Ilex*.

Holodiscus—*Rosaceae*. Hardy deciduous flowering shrubs, formerly included in *Spiraea*.

CULTURE: Soil, good ordinary well drained. Position, sunny.

PROPAGATION: By seeds; layers.

SPECIES CULTIVATED: *H. discolor* (syn. *Spiraea discolor*), creamy-white, July, 8 to 14 ft., W. North America, var. *ariaefolius* (syn. *Spiraea ariaefolia*), leaves grey, pubescent beneath; *dumosus*, flowers in panicles, 8 ft., Southern N. America.

Holy Ghost, see *Archangelica*; **-flower**, see *Peristeria elata*.

Holy Thistle, see *Silybum Marianum*.

Homalocladium—*Polygonaceae*. Greenhouse shrub with flat, articulated, striate stems, usually leafless in the flowering stage. Grown as a curiosity and sometimes included in the genus *Muehlenbeckia*.

CULTURE: As *Muehlenbeckia*.

PROPAGATION: As *Muehlenbeckia*.

SPECIES CULTIVATED: *H. platycladum* (syn. *Muehlenbeckia platyclados*), 'Centipede Plant', to 10 ft., Solomon Islands.

Homeria—*Iridaceae*. Handsome greenhouse bulbous plants. First introduced late eighteenth century.

POT CULTURE: Compost, loam, leaf-mould and sand in equal parts. Place bulbs 1 in. apart and 1 in. deep in 5 in. pots during Sept. and Oct. Stand in a cold frame and cover with a few inches of coconut-fibre refuse till growth begins, then remove to greenhouse. Plant in pots near the glass. Water freely during active growth. Keep nearly dry after flowers fade to ripen bulbs. Repot annually in autumn.

OUTDOOR CULTURE: Plant bulbs 3 to 4 in. deep in light, rich, well-drained soil in a south border between Oct. and Jan. Protect with bracken litter in winter.

PROPAGATION: By offsets removed at planting time.

SPECIES CULTIVATED: *H. collina* (syn. *Moraea collina*), red and yellow, spring, 1 ft., S. Africa, var. *aurantiaca*, orange, red and yellow, spring, 1 ft., S. Africa; *elegans*, yellow, brown and orange, summer, 1 ft., S. Africa; *lineata*, red and yellow, spring, 1 ft., S. Africa; *miniata*, red, spring, 6 to 8 in., S. Africa.

Homogyne—*Compositae*. Dwarf evergreen perennial rock plants.

CULTURE: Almost any reasonably good soil. Position, sunny.

PROPAGATION: By seeds; division of plants in spring or autumn.

SPECIES CULTIVATED: *H. alpina*, pink, 3 in., summer, S.E. Europe; *discolor*, pink, leaves with silver reverse, 3 in., summer, Alps.

Honesty, see *Lunaria biennis*.

Honey Locust, see *Gleditsia*.

Honeysuckle, see *Lonicera*.

Honeywort, see *Cerinth*.

Hoodia—*Asclepiadaceae*. Greenhouse succulent flowering plants. Stems, cylindrical, prickly, leafless. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts sandy loam, old mortar, broken bricks and dry cow manure. Position, well-drained pots, fully exposed to sun in warm greenhouse. Repot every three or four years in Feb. or March. Water moderately March to Oct., keep quite dry Oct. to March. Temp., April to Sept. 65° to 75°, Sept. to April 45° to 55°.

PROPAGATION: By portions of fleshy stems 3 in. long cut clean at base and laid on sunny shelf to dry for several days; then insert in small well-drained pots of sandy soil in temp. of 55° to 65°, April to Aug.

SPECIES CULTIVATED: *H. Bainii*, yellow, Aug., 1 ft., S. Africa; *Gordonii*, yellow and purple, July, 18 in., S. Africa.

Hookera, see *Brodiaea*.

Hop, see *Humulus*; **-Hornbeam**, see *Ostrya*; **-tree**, see *Ptelea trifoliata*.

Hordeum—*Gramineae*. Hardy annual flowering grass. Inflorescence barley-like, borne in spikes, June to Sept., very useful for cutting. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, open dryish borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in March or April in borders where plants are required to flower.

SPECIES CULTIVATED: *H. jubatum*, 'Squirreltail Grass', 2 ft., N. America.

Horehound, see *Marrubium*.

Horminum—*Labiatae*. Hardy herbaceous perennial. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open well-drained borders. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep outdoors in March or April; by division of roots, Oct. to March.

SPECIES CULTIVATED: *H. pyrenaicum*, 'Pyrenean Dead Nettle', blue, summer, 1 ft., Pyrenees.

Hornbeam, see *Carpinus Betulus*.

Horn of Plenty, see *Fedia Cornucopiae* and *Datura Metel*.

Hornwort, see *Ceratophyllum*

Horned Poppy, see *Glaucium*; **-Rampion**, see *Phyteuma orbiculare*; **-Violet**, see *Viola cornuta*.

Horse Chestnut, see *Aesculus Hippocastanum*; **-mint**, see *Monarda*; **-radish**, see *Armoracia rusticana*; **-shoe Vetch**, see *Hippocrepis comosa*; **-tail**, see *Equisetum*.

Hosta (Plantain Lily)—*Liliaceae*. Hardy herbaceous flowering plants with ornamental foliage, formerly known as *Funkia*. First introduced late eighteenth century.

CULTURE: Soil, ordinary, with decayed manure. Position, open sunny well-drained borders. Plant, Oct. or March. Top-dress annually with decayed manure.

POT CULTURE: Compost, two parts loam, one part well-decayed manure and sand. Position, pots in cold frame Oct. to March, greenhouse or window March

to Oct. Pot, March or April. Water moderately Oct. to March, freely other times. Apply liquid manure to healthy plants when in flower.

PROPAGATION: By division of crowns in Oct., March or April.

SPECIES CULTIVATED: *H. crispula* (syn. *H. Fortunei albo-marginata*), whitish, July, 2½ ft., Japan; *decorata*, dark lilac, July, 2 ft., Japan; *erromena*, whitish, July, 2½ ft., Japan; *Fortunei* (syn. *Funkia Fortunei*), whitish, July, 2 ft., Japan; *glaucula* (syn. *Funkia glauca*), whitish, July, 1½ ft., Japan; *lancifolia* (syn. *Funkia lancifolia*), lilac, Aug., 2 ft., Japan; *plantaginea* (syn. *Funkia subcordata*), 'Corfu Lily', white, fragrant, Sept., 2½ ft., China; *rectifolia*, dark lilac, Aug., 2 ft., Japan; *tardiflora*, lilac, 9 in., Oct., Japan; *undulata*, whitish, July, 2½ ft., Japan; *ventricosa* (syn. *H. caerulea*, *Funkia ovata*), dark violet, July, 3 ft., China.

Hottentot Fig, see *Carpobrotus edulis*; **-Bread**, see *Testudinaria elephantipes*.

Hottonia (Water Violet)—*Primulaceae*. Hardy aquatic perennial herb.

CULTURE: Soil, ordinary. Position, shallow water in aquarium, ponds and rivulets or in bogs. Plant, March to July.

PROPAGATION: Division, setting each plant separately in a pot and lowering in the water or weighting individually.

SPECIES CULTIVATED: *H. palustris*, pinnate foliage, in whorls round stem, lilac flowers in whorls 8 to 10 in. above water level, Europe (Br.).

Houlletia—*Orchidaceae*. Evergreen epiphytal orchids. Flowers fragrant, on usually erect spikes from base of pseudo-bulbs which carry generally but one leaf. Flowers rather large. Lip more or less spear-shaped, horned at base.

CULTURE: Compost and temps. as for Stanhopeas. Pots are preferable to baskets. Rest, after growth is matured, not too severe.

PROPAGATION: By division of plants when, or just before, growth commences.

SPECIES CULTIVATED: *H. Brocklehurstiana*, brown and yellow, summer, 2 ft., Brazil; *odoratissima*, red, white, summer, 2 ft., Colombia, var. *antioquiensis*, larger, lip with more yellow; *picta*, cinnamon brown, yellow, summer, Colombia; *Sanderi*, creamy-white to yellow, malodorous, summer, Peru; *Wallisii* (syn. *H. chrysantha*), yellow, chocolate and crimson, summer, 2 ft., Colombia.

Houpara, see *Pseudopanax Lessonii*.

Houstonia—*Rubiaceae*. Hardy herbaceous perennials. First introduced late eighteenth century.

CULTURE: Soil, leaf-mould and sand. Position, partially shaded crevices, nooks and crannies of moist rockeries. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in pans of leaf-mould and sand in cold frame in spring or autumn; division of roots in Sept. or Oct.

SPECIES CULTIVATED: *H. caerulea*, 'Bluets', blue, May to July, 4 to 6 in., Virginia, var. *alba*, white; *purpurea*, white to pink, summer, 6 to 12 in., N. America; *serpyllifolia*, white, summer, 3 in., N. America.

Houseleek, see *Sempervivum*.

Houttuynia—*Saururaceae*. Hardy aquatic perennial for the waterside. First introduced early nineteenth century.

CULTURE: Soil, heavy loam. Position, boggy or wet ground or in shallow water. Plant, spring.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *H. cordata*, white flowers, heart-shaped leaves, 18 to 24 in., China and Japan.

Hovea—*Leguminosae*. Greenhouse evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, three parts peat, one part loam and little silver sand. Position, well-drained pots in light airy greenhouse. Pot, Feb. or March. Nip off points of young shoots in spring to induce bushy growth. Water freely April to Sept., moderately Sept. to April. Temp., March to July 55° to 65°, Sept. to

March 45° to 50°. Place plants outdoors from July to Sept. to mature flowering shoots for following year.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in well-drained pots of sandy peat in temp. of 55° to 65° in March or April; cuttings inserted in sandy soil under bell-glass in temp. 55°, April to July.

SPECIES CULTIVATED: *H. Celsii*, blue, spring, 3 ft., Australia; *longifolia*, purple, spring, 5 ft., Australia; *pungens*, blue, spring, 1 to 2 ft., Australia.

Howea—*Palmae*. Greenhouse palms with feather-shaped, graceful leaves. Elegant plant for house decoration.

CULTURE: Compost, equal parts loam and peat, little silver sand. Position, well-drained pots in greenhouse, or in dwelling rooms during summer. Pot, Feb. or March. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°. Water moderately Oct. to Feb., freely afterwards. Apply weak liquid manure to healthy plants once a week May to Sept. Syringe plants daily. Sponge leaves of those grown in dwelling rooms once weekly.

PROPAGATION: By seeds sown 1 in. deep in light soil in temp. 80°, Feb. or March.

SPECIES CULTIVATED: *H. Belmoreana* (syn. *Kentia Belmoreana*), 6 to 10 ft., Lord Howe's Island; *Forsteriana* (syn. *Kentia Forsteriana*), 6 to 15 ft., Lord Howe's Island.

Hoya—*Asclepiadaceae*. Stove and greenhouse climbing, flowering evergreen plants. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat and loam, little charcoal and sand. Position, well-drained pots, beds or hanging baskets, with shoots trained round trellises, up rafters, or against walls, and fully exposed to the light. Pot or plant, Feb. or March. Water freely March to Sept., moderately Sept. to March. Temp., stove species, 65° to 75° March to Oct., 55° to 65° Oct. to March; greenhouse species, 55° to 65° March to Sept., 45° to 55° Sept. to March. Prune into shape, Feb. Foot stalks of flowers should not be removed after blooming, as these will produce a second crop of flowers.

PROPAGATION: By cuttings of shoots of preceding year's growth inserted in well-drained pots of sandy peat under bell-glass in temp. of 75° to 85° in March, April or May; layering shoots in pots of sandy peat in spring or summer.

STOVE SPECIES CULTIVATED: *H. bella*, white and crimson, summer, 3 ft., Burma.

GREENHOUSE SPECIES CULTIVATED: *H. australis* (syn. *H. Dalrympleana*), white, tinged pink, October, Australia; *carnosa*, 'Honey Plant', 'Wax Flower', pink and white, summer, 10 to 12 ft., China and Australia, and var. *variegata*.

Huckleberry, see *Gaylussacia*.

Hudsonia—*Cistaceae*. Slightly tender evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts peat and one of sea sand. Position, well-drained rock gardens, full sun, sheltered from winds; or in pots for unheated greenhouse. A difficult plant to establish, but sometimes succeeds in a slightly saline soil.

PROPAGATION: By cuttings of firm shoots 1 to 2 in. long inserted in well-drained pots of silver sand under bell-glass in greenhouse, April to Aug.; layering in Sept. and Oct.

SPECIES CULTIVATED: *H. ericoides*, yellow, May to July, 6 to 8 in., U. States; *tomentosa*, yellow, June, 1 ft., N. America.

Hugelia, see *Gilia*.

Humata—*Polypodiaceae*. Stove and greenhouse ferns, formerly included in the genus *Davallia*.

CULTURE: As *Davallia*.

PROPAGATION: As *Davallia*.

STOVE SPECIES CULTIVATED: *H. heterophylla* (syn. *Davallia heterophylla*), dwarf, creeping, Malay; *repens* (syn. *Davallia pedata*), dwarf, India, Malaya, etc.

GREENHOUSE SPECIES CULTIVATED: *H. Tyermannii*, 'Bear's-foot Fern', creeping, W. Africa, etc.

Humble-plant, see *Mimosa pudica*.

Humea—*Compositae*. Half-hardy biennial. First introduced early nineteenth century.

GREENHOUSE CULTURE: Compost, two parts sandy loam, half a part decayed manure, half a part charcoal and silver sand. Position, well-drained pots in cold frame during summer; airy greenhouse in winter and when in flower. Sow in June or July for blooming the following year. Water freely March to Oct., very little afterwards. Syringing unnecessary. Temp., Oct. to April 50°, April to Oct. 55° to 65°. Discard plants after flowering. Fine plants can be obtained in 8 in. pots.

OUTDOOR CULTURE: Soil, ordinary rich. Position, sunny well-drained beds or borders. Plant out in June. Water freely in dry weather.

PROPAGATION: By seeds sown on surface of fine soil in well-drained pots or pans, covering seeds slightly with fine soil, in June, in cold frame or greenhouse, potting seedlings singly in 2 in. pots when large enough to handle.

SPECIES CULTIVATED: *H. elegans*, 'Amaranth Feathers', red, pink and crimson, in feathery panicles, June to Oct., 3 to 10 ft., Australia.

Humulus—*Moraceae*. Hardy annual and perennial twining climbers. Male blooms borne in axillary panicles, and female blooms in cones in clusters on separate plants; the latter form the hop of commerce and are the more ornamental.

CULTURE OF ANNUAL SPECIES: Soil, ordinary rich. Position, sunny or shady walls, fences, arbours, trellises or tree stumps. Plant, May or June. Water freely in dry weather. This species is an excellent plant for covering unsightly objects rapidly in summer.

CULTURE OF PERENNIAL SPECIES: Soil, deep, rich and well-manured loam. Position, sunny walls, fences, arbours, trellises, tree stumps, or in open ground with shoots trained round poles. Plant in groups of three, or 6 or 12 in. apart in rows 4 to 5 ft. asunder, Feb. or March. Top-dress annually with decayed manure in Feb. or March. Water freely in dry weather. Gather female flowers (hops) in Sept. for drying. Cut down plants in Oct.

PROPAGATION: Annual species by seeds sown $\frac{1}{8}$ in. deep in pots of ordinary soil in cool or heated greenhouse in April, or where plants are required to grow in May; perennial species by seeds sown $\frac{1}{8}$ in. deep in ordinary soil outdoors in March or April; division of roots in March.

ANNUAL SPECIES CULTIVATED: *H. japonicus variegatus*, 'Japanese Hop', 8 to 10 ft., green and white variegated foliage, Japan.

PERENNIAL SPECIES CULTIVATED: *H. Lupulus*, 'Hop', 10 to 15 ft., Europe; the golden-leaved form, *aureus*, is superior for garden cultivation.

Hunnemannia—*Papaveraceae*. Half-hardy herbaceous perennial. First introduced early nineteenth century.

CULTURE: Soil, ordinary rich. Position, sunny well-drained border at base of south wall. Plant, March. Protect with dry litter in winter.

PROPAGATION: By seeds sown as soon as ripe in a cold frame, planting out seedlings following June.

SPECIES CULTIVATED: *H. fumariifolia*, yellow, Aug., 2 ft., Mexico.

Huntleya—*Orchidaceae*. An epiphytic genus, separated from *Zygopetalum*, as pseudo-bulbs are absent. The scapes bear a single handsome flower with a raised transverse crest.

CULTURE: Compost, two parts of osmunda fibre, two parts of sphagnum moss. Pots or pans well drained. Water throughout the year and keep the atmosphere moist. Winter temp. 65°, summer to 75° by sun heat with shading.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *H. albido-fulva*, whitish, brown, rose-crimson, summer, Brazil, Trinidad; *Burtii* (syn. *Batemannia Burtii*), whitish, yellow, red-brown,

summer, Costa Rica; *meleagris* (syn. *Batemannia meleagris*), yellowish, yellow, red-brown and white, summer, Brazil; *Wallisii*, variable, green, brown, yellowish, scarlet streaks on petal bases, summer, Colombia, Costa Rica; *Wallisii major*, much larger and darker.

Huon Pine, see *Dacrydium Franklinii*.

Hutchinsia—*Cruciferae*. Hardy annual and perennial herbs.

CULTURE: Soil, sandy. Position, open sunny rockeries or margins of borders. Plant, March or April.

PROPAGATION: Annual species, by seeds sown and slightly covered with fine soil where plants are required to grow in March or April; perennial species, by seeds sown similarly, or by division of plants in March or April.

SPECIES CULTIVATED: *H. alpina* (syn. *H. Auerswaldii*), white, spring, 1 to 3 in., perennial, Alps; *H. petraea*, white, spring, 3 in., annual, Britain.

Hyacinth, see *Hyacinthus*; -**Bean**, see *Dolichos Lablab*.

Hyacinthus (*Hyacinth*)—*Liliaceae*. Hardy bulbous flowering plants. First introduced late sixteenth century.

CULTURE OF COMMON HYACINTHS IN POTS: Compost, fibrous loam, leaf-mould and sharp sand. Position, first plunge under cinder ashes in cold frame or outdoors, afterwards in window or greenhouse. Pot, Sept. to early Nov., placing one bulb half its depth in a 6 in. pot or three in an 8 in. pot. Water only when growth begins, and with increasing liberality afterwards. Apply liquid manure occasionally when flower spikes form. After flowering plant bulbs outdoors.

CULTURE IN GLASSES: Place bulbs in glasses so that base just touches water. Time, Sept. to Oct. Water, soft or rain, and little charcoal; add fresh as required. Put in dark position until roots form, then remove to light. No stimulant needed.

CULTURE IN BEDS: Soil, ordinary, enriched with manure previous autumn. Position, open, sunny. Plant bulbs 3 to 4 in. deep and 8 in. apart, Sept. to Oct. Protect surface of bed by covering of peat. Apply liquid manure once or twice when flower spikes appear. Lift and dry bulbs in June, storing in cool place till planting time.

CULTURE OF ROMAN HYACINTH: Compost, as advised above. Position, pots under ashes in cold frame or outdoors till rooted, then in heated greenhouse or window. Pot, Aug., Sept. and Oct., placing three in a 5 in. pot. Depth for planting, 1 in. Water only when removed from the ashes, and regularly afterwards. Temp. when in greenhouse or window, 55° to 65°.

CULTURE OF SPANISH HYACINTH: Soil, light rich. Position, well-drained sunny borders. Plant, Sept. or Oct. Top-dress annually with decayed cow manure in Feb. Lift and replant only when bulbs show signs of deterioration.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light sandy soil in boxes in cold frame or outdoors in Sept.; by offsets removed from old bulbs when lifted and planted 6 in. apart each way outdoors in Oct. Seedling bulbs flower when three years old, and attain full size when seven years old.

SPECIES CULTIVATED: *H. amethystinus*, 'Spanish Hyacinth', blue, spring, 1 ft., Pyrenees, var. *albus*, white; *candicans*, see *Galtonia candicans*; *ciliatus* (syn. *H. azureus*), sky blue, 6 in., Asia Minor; *orientalis*, 'Common Hyacinth', various colours, spring, Medit. Region, var. *albulus*, 'Roman Hyacinth', white.

Hydrangea—*Saxifragaceae* (or *Hydrangeaceae*). Greenhouse and hardy deciduous flowering shrubs. First introduced early eighteenth century.

POT CULTURE: Compost, two parts rich loam, one part well-decayed manure and sharp sand. Position, cool greenhouse, frame or room Oct. to March; greenhouse, window or warm terrace March to Oct. Pot, Feb. or March. Water abundantly March to Oct., moderately afterwards. Prune, Aug. or Sept., cutting out all weak shoots and those that have flowered. Flowers are produced on shoots arising from vigorous growths of the previous year. Best blooms are obtained on plants propagated by cuttings annually in August. Apply liquid manure frequently to plants showing flower. Temp. for early flowering (Jan. to May) 55°

to 65°. Blue flowers may be obtained in many kinds by planting in acid soil or by use of one of the proprietary blueing powders. The kinds grown for decoration in pots are mainly vars. of the *Hortensia* section of the Japanese *H. macrophylla*; many are suitable for outdoor cultivation and once established are hardier than is generally supposed.

OUTDOOR CULTURE: Soil, ordinary, rich. Position, sunny or semi-shaded borders, preferably with protection and slight shade from the east. *H. paniculata* in any open situation and *H. petiolaris* against a west wall in well-drained border. Young growth of *H. Sargentiana* is liable to be injured by early spring frosts. Plant, Oct. to Nov. or March to April. Top-dress annually. Prune straggling or dead shoots in March. *H. arborescens* and *H. paniculata* should be pruned annually to within 1 in. of the base in March or April. Water freely in dry weather and apply liquid manure when flower buds appear.

PROPAGATION: By cuttings of young shoots inserted singly in 2 in. pots of light sandy soil under bell-glass in temp. 55° to 65° in March or April; cuttings of points of firm shoots 2 to 3 in. long in well-drained pots of sandy soil in cold frame in August; suckers separated from parent plant in Nov. or March; layering in spring for *H. quercifolia*.

SPECIES CULTIVATED: *H. arborescens grandiflora*, white, July to Sept., hardy, 4 ft., East U.S.A.; *Bretschneideri*, white, 8 to 10 ft., June, July, a good hardy species, China; *heteromalla*, white, 10 ft., June, July, downy leaves, Himalaya; *macrophylla*, blue, pink and white, to 12 ft., June, July, China, Japan, and vars. *Hortensia*, pink to blue all sterile, *Mariesii*, rose-pink slightly toothed, *Otaksa*, dwarfer form, etc.; *paniculata*, whitish in panicles, 30 ft., Aug. to Sept., China, Japan, vars. *grandiflora*, the common outdoor hydrangea with long panicles of whitish flowers, nearly all sterile, *praecox*, flowers about six weeks earlier than the type; *petiolaris*, self-clinging climbing species, white, June, July, to 50 ft., Japan; *quercifolia*, white, June, July, scalloped leaves, 6 ft., rather tender, S.E. United States; *Sargentiana*, pale violet, July, August, 6 ft., large velvety leaves, rather tender, China; *xanthoneura*, white in convex corymbs, July, to 15 ft., W. China, var. *Wilsonii*, oblong leaves lustrous above.

Hydrilla—*Hydrocharitaceae*. Tender, submerged, oxygenating perennials resembling Elodea, with bristly leaves in whorls up the stem.

CULTURE: Soil, loam or aquarium compost. Position, tropical tank. Plant, spring or early summer.

PROPAGATION: Cuttings in shallow tanks in growing season.

SPECIES CULTIVATED: *H. verticillata*, India and Ceylon.

Hydrocharis (Frog-bit)—*Hydrocharitaceae*. Hardy aquatic floating perennial.

CULTURE: Soil, muddy. Position, shallow ponds, lakes or rivulets. Plant, by dropping on water, March to June.

PROPAGATION: By autumn buds which appear naturally and drop to the bottom in autumn and rise again in spring.

SPECIES CULTIVATED: *H. Morsus-ranae*, green and white, summer, Europe (Brit.).

Hydrocleys (Water Poppy)—*Butomaceae*. Half-hardy aquatic perennial. First introduced early nineteenth century.

CULTURE: Soil, two parts loam and one part leaf-mould. Position, sunny, shallow ponds or tubs sunk in ground. Plant 6 in. below surface of water in March. In cold districts plants best wintered in frost-proof greenhouse.

PROPAGATION: By seeds in pots of rich soil sunk in water or division of roots in spring.

SPECIES CULTIVATED: *H. nymphoides* (syn. *Limnocharis Humboldtii*), yellow, rounded floating leaves, July to Sept., Brazil.

Hydrocotyle—*Umbelliferae* or *Hydrocotylaceae*. Creeping perennial plants.

CULTURE: Any reasonably good soil, excellent ground coverers in a cool position.

PROPAGATION: By seeds; cuttings; layers.

SPECIES CULTIVATED: *H. moschata*, flowers inconspicuous, neat evergreen carpets, slightly invasive, New Zealand.

Hydrolea—*Hydrophyllaceae*. Annual or perennial sub-shrubby stove plants. Introduced late eighteenth century.

CULTURE: Soil, rich. Position, margin of indoor pool or in pot standing in pan of water. Plant, spring.

PROPAGATION: By cuttings in very sandy soil under glass; seed.

SPECIES CULTIVATED: *H. spinosa*, 1 to 2 ft., pale blue, thorns in axils of leaves, Trop. America; *zeylanica*, blue and white, Trop. America.

Hydrotrida (Hedge Hyssop)—*Scrophulariaceae*. Low-growing tender aquatics used for marginal work or in tropical aquariums. Sometimes known as *Herpestis*. First introduced late eighteenth century.

CULTURE: Soil, soft mud at pond edge or submerged in fish tank. Plant, spring or summer.

PROPAGATION: Seeds sown in shallow pans submerged just below water level; cuttings in spring; or division.

SPECIES CULTIVATED: *H. Caroliana* (syn. *Herpestis amplexicaulis*), 6 to 18 in., soft blue flowers, N. America; *Monniera*, prostrate, pale blue, cosmopolitan.

Hymenanthera—*Violaceae*. Hardy semi-evergreen berry-bearing shrub. First introduced mid-nineteenth century.

CULTURE: Soil, loam, peat and leaf-mould. Position, margin of a rhododendron or azalea bed, or on a sunny rockery. Plant, May or September. Prune to remove dead wood only.

PROPAGATION: By cuttings of ripened shoots in sandy peat in a cold frame in autumn.

SPECIES CULTIVATED: *H. crassifolia*, yellow, pansy-like flowers, succeeded by pearly-white berries in autumn, 3 to 4 ft., New Zealand.

Hymenocallis—*Amaryllidaceae*. Stove and greenhouse bulbous evergreen and deciduous plants. Flowers, fragrant. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part decayed manure and half a part silver sand. Position, well-drained pots in sunny part of stove and greenhouse. Margins of indoor pools for *H. crassifolia*. Pot, March. Repotting necessary every three or four years only. Water abundantly April to Sept., moderately Sept. to Dec., keep quite dry Dec. to March. Apply liquid manure once or twice a week May to Sept. Temp. for stove species, 70° to 80° March to Sept., 55° to 65° Sept. to March; greenhouse species, 55° to 65° April to Sept., 45° to 50° Sept. to April.

PROPAGATION: By offsets removed from old bulbs in March and treated as above.

STOVE SPECIES CULTIVATED: *H. crassifolia*, white, fragrant, strap-shaped leaves, Kentucky; *eucharidifolia*, white, spring, 2 ft., Trop. America; *macrostephana*, white, spring, 2 ft., hybrid; *ovata*, white, autumn, 1 ft., W. Indies; *speciosa*, white, spring, 1 ft., W. Indies.

GREENHOUSE SPECIES: *H. calathina*, white, spring, 1 ft., Peru.

Hymenophyllum—*Hymenophyllaceae*. Stove, greenhouse and half-hardy ferns with delicate, feathery, membranous fronds.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, equal parts peat, loam, leaf-mould, charcoal, sandstone and silver sand. Position, moist, shady, in recesses of rockeries, under bell-glasses or in cases. Plant, March. Water freely March to Oct., moderately afterwards. Atmospheric moisture must be maintained always. Shade is most essential. Temp. stove species, March to Oct. 65° to 75°, Oct. to March 55° to 65°; greenhouse species, Sept. to March 45° to 55°, cool through summer.

CULTURE OF HALF-HARDY SPECIES: Compost, as above. Position, deep, moist, shady frames or tubs, etc., away from direct light and sunshine. Plant, March. Water freely in summer, moderately other times. Always maintain atmospheric moisture. Protect in severe weather.

CULTURE IN CASES IN ROOMS: Compost, as above. Position, shady window, not exposed to sun. Plant, March. Top-dress with fresh compost annually in March. Water freely April to Sept., moderately afterwards. Ventilate case a few minutes daily.

PROPAGATION: By spores sown on surface of sandy peat in shallow pan covered with bell-glass in temp. 65° to 75° at any time; by division of plant at potting time.

STOVE SPECIES CULTIVATED: *H. caudiculatum*, Chile; *dichotomum*, Chile; *polyanthos*, beautiful, slender fern, W. Indies; *sericeum*, soft, long, narrow, Jamaica.

GREENHOUSE SPECIES CULTIVATED: *H. demissum*, New Zealand, Malaya; *flabellatum*, Australia.

HALF-HARDY SPECIES CULTIVATED: *H. tunbridgense*, 'Tunbridge Fern', withstands frost better than drought, Britain.

Hyophorbe—*Palmae*. Stove palm with feather-shaped, deep green leaves. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, shady, moist. Pot, Feb. or March. Water abundantly March to Oct., moderately afterwards. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 65°.

PROPAGATION: By seeds sown 1 in. deep in pots of light soil in temp. 85° in March.

SPECIES CULTIVATED: *H. amaricaulis*, 6 to 10 ft., Mauritius; *indica*, 8 ft. Mascarene Islands; *Verschaffeltii*, 5 to 10 ft., Mascarene Islands.

Hypericum (St. John's Wort)—*Guttiferae* (or *Hypericaceae*). Evergreen and deciduous shrubs and sub-shrubs, and a few hardy perennials, some species slightly tender, the rest hardy.

CULTURE: Soil, ordinary, well drained. Position, sunny. *H. calycinum* on banks or in full shade under trees, the tender kinds require wall protection. *H. elodes* at edges of outdoor pools in S. England. Plant, Oct. to Nov. or Feb. to March. Prune *H. calycinum* and *H. Moserianum* almost to ground in March, other kinds should have frost-damaged wood removed in March.

PROPAGATION: By seed in most cases; Aug. cuttings in sandy soil in cold frame; division in spring for *H. calycinum*.

SPECIES CULTIVATED: *H. Androsaemum*, 'Tutsan', 3 ft., half-woody, will grow in semi-shade, June to Aug., yellow, Europe, inc. Br.; *calycinum*, 'Rose of Sharon', 'Aaron's Beard', low-growing evergreen, flowering all summer, 18 in., S.E. Europe, Asia Minor; *Coris*, sub-shrub, yellow, summer, 6 to 9 in., S. Europe; *Dyeri* (syn. *H. lysimachioides*), half-evergreen, yellow, 3 ft., summer, Himalaya; *elatum*, yellow, summer, 5 ft., leaves aromatic, Canary Is.; *elodes*, 'Marsh Hypericum', yellow, downy leaves, creeping, Europe (Br.); *empetrifolium*, rather tender, yellow, July to Sept., 1 ft., Greece; *fragile*, sub-shrub, pale gold, July to Aug., 6 in., Greece; *frondosum* (syn. *H. aureum*), deciduous, bright yellow, summer, 4 ft., Georgia; *hircinum*, evergreen, semi-woody, very hardy and attractive, yellow, Aug. to Oct., Medit. Region, and var. *pumilum*, a good dwarf form; *Hookerianum*, half-evergreen, yellow, Aug. to 6 ft., hardy except in bleak situations, Himalaya and Assam; *Moserianum*, best dwarf garden form, golden-yellow, July to Oct., 18 in., hybrid; *olympicum*, large-flowered, golden-yellow, June to Aug., 1 ft., Asia Minor; *patulum*, golden-yellow, July to Sept., 4 ft., deciduous, hardy, Yunnan, and vars. *Henryi*, more vigorous, *Forrestii*, larger flowers, probably the best of all shrubby hypericums, *uralum*, smaller flowers and leaves; *repens*, prostrate perennial with heath-like growth, bright yellow, June to Aug., 6 to 8 in., Asia Minor; *reptans*, prostrate, yellow flowers, reddish buds, Aug. to Oct., vigorous bright green close tufts of foliage, Sikkim.

Hypolepis—*Polypodiaceae*. Stove and greenhouse evergreen ferns. Fronds, feather-shaped. First introduced early nineteenth century.

CULTURE OF STOVE SPECIES: Compost, equal parts loam, leaf-mould and sand. Position, well-drained pots or hanging baskets in shady part of stove. Pot, March. Water freely March to Sept., moderately afterwards. Syringing undesirable. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

CULTURE OF GREENHOUSE SPECIES: Compost, as above. Position, well-drained pans or beds in shade. Pot, March. Water freely March to Sept., moderately afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

PROPAGATION: By spores sown on surface of well-drained pans of sandy peat and leaf-mould under bell-glass in temp. 65° to 75° at any time; division of creeping rhizomes in March.

STOVE SPECIES CULTIVATED: *H. repens*, creeping rhizomes, Trop. America, Jamaica.

GREENHOUSE SPECIES CULTIVATED: *H. Bergiana*, creeping rhizomes, S. Africa; *ternifolia*, New Zealand.

Hypoxis (Star Grass)—Amaryllidaceae. Greenhouse bulbous-rooted plants. First introduced mid-eighteenth century.

CULTURE: Compost, two parts peat, one of leaf-mould and sand. Position, well-drained pots, or beds in cold frame. Pot, Aug. to Nov., covering pots with cinder ashes in cold frame or greenhouse till growth begins. Water moderately from time bulbs begin to grow until flowers fade, then gradually withhold it, keeping bulbs dry until growth recommences. Temp., Sept. to Feb. 40° to 50°, 50° to 60° afterwards.

PROPAGATION: By offsets, removed at potting time and treated as old bulbs.

SPECIES CULTIVATED: *H. hirsuta*, yellow, 12 in. N. America; *hygrometrica* (syn. *Rhodohypoxis hygrometrica*), 'Golden Weatherglass', yellow, to 6 in., Australia; *stellata*, white, striped green outside, spring, 6 to 12 in., S. Africa.

Hypsela—Lobeliaceae. Creeping perennial rock plants.

CULTURE: Soil, well drained. Position, cool.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *H. longiflora*, white and pink, $\frac{1}{2}$ in., spring and summer, Chile.

Hyssopus (Hyssop)—Labiatae. Hardy evergreen shrub. Leaves, narrow, aromatic. Shoots and flowers, infused in water, are largely used as an expectorant; also for distilling for yielding oils for perfumery and flavouring liquors. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary, light. Position, dry, warm borders. Plant, March to May, 12 in. apart each way. Prune into shape, April. Gather shoots for medicinal purposes at any season; when flowers open for distilling.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep outdoors in April—transplant June or July; cuttings of shoots inserted in shady position in April or May; division of roots in Feb., March, Sept. or Oct.

SPECIES CULTIVATED: *H. officinalis*, blue, June to Sept., 1 to 2 ft., S. Europe.

Iberis (Candytuft)—Cruciferae. Hardy annuals and evergreen perennials.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in patches or lines in March to May for flowering in summer, Aug. or Sept. for spring flowering. Thin out seedlings to 2 in. apart in June.

POT CULTURE: Compost, two parts good soil, one part decayed manure, leaf-mould and sand. Size of pots, 5 in. in diameter. Sow seeds $\frac{1}{8}$ in. deep in April or May. Place pots in cold frame till June, then stand outdoors. Thin seedlings to an inch apart in June. Water moderately. Apply weak liquid manure occasionally when flowers show.

CULTURE OF PERENNIAL SPECIES: Soil, light sandy loam. Position, fissures or ledges of sunny rockeries or margins of well-drained sunny borders. Plant, Oct., March or April.

PROPAGATION: Annual species by seeds sown as above; perennial species by seeds sown $\frac{1}{16}$ in. deep in shallow boxes of sandy soil in cold frame in April; cuttings of partially ripened shoots, from 1 to 2 in. long, inserted in well-drained pots in cold frame or in beds under handlight outdoors, July to Oct.; division of roots, Oct. or March.

ANNUAL SPECIES CULTIVATED: *I. amara*, 'Rocket Candytuft', white, summer, 1 ft.; *umbellata*, 'Common Candytuft', purple, summer, 1 ft., S. Europe, and several vars.

SHRUBBY SPECIES CULTIVATED: *I. gibraltaria*, lilac, 12 in. spring, Spain, Morocco; *Jordanii*, white, 4 in., May, Asia Minor; *saxatilis*, white, tinged purple, 4 to 6 in., May, S. Europe; *sempervirens*, white, 9 in., May, S. Europe, Asia Minor, and a number of garden vars.

Ibicella—*Martyniaceae*. Coarse, viscid-pubescent herbs. Flowers in dense, compact terminal racemes. The fruit may be used for pickles as in *Proboscidea*.

CULTURE: Soil, ordinary rich. Position, warm.

PROPAGATION: By seed in warm house in March.

SPECIES CULTIVATED: *I. lutea* (syns. *Martynia lutea*, *Proboscidea lutea*), greenish-yellow without and deeper yellow to orange within, sometimes red-blotched, Aug., to 1½ ft., annual, Brazil to Argentina.

Iboza—*Labiatae*. Greenhouse perennial flowering plant with nettle-like foliage, formerly known as *Moschosma*.

CULTURE: Compost, equal parts loam and decayed manure, little sand. Position, greenhouse, Sept. to June; cold frame, June to Sept. Pot, March. Water freely March to Oct., moderately afterwards. Apply stimulants occasionally a month after repotting until flowers expand, then cease. Temp., Sept. to March 45° to 55°, March to June 55° to 65°. Cut down shoots to within 3 in. of their base after flowering. Young plants: insert cuttings 3 in. long of young shoots in light, sandy soil in temp. 65° in Feb. or March. When rooted, place singly in 3½ in. pots. Nip off point of main shoots, also of succeeding shoots when 3 in. long. Shift into 5 or 6 in. pots when former pots are filled with roots. Water freely. Apply stimulants occasionally. Place in cold frame, June to Sept.

PROPAGATION: By cuttings inserted in sandy soil in temp. 65° in spring.

SPECIES CULTIVATED: *I. riparia* (syn. *Moschosma riparium*), white and purple, winter, 2 to 3 ft., S. Africa.

Ice Plant, see *Cryophytum crystallinum*.

Idesia—*Flacourtiaceae*. Hardy deciduous flowering tree with heart-shaped leaves. Flowers in panicles. Male flowers orange, female green, borne on separate trees. Berries, small, purplish-black.

CULTURE: Soil, ordinary, sandy. Position, well-drained shrubberies. Plant, Oct. to Feb. Prune into shape after flowering.

PROPAGATION: By seeds sown ½ in. deep in sandy soil in temp. 65° to 75° in March; cuttings of firm shoots, 3 to 4 in. long, inserted in well-drained pots of sandy soil under bell-glass in temp. 65° to 75° in March or Sept.

SPECIES CULTIVATED: *I. polycarpa*, 10 to 15 ft., Japan.

Ilex (Holly)—*Aquifoliaceae*. Hardy and tender evergreen and deciduous shrubs or trees. Greenish flowers sometimes bisexual and sometimes male and female borne on separate plants, which accounts for some specimens not berrying. Leaves, dark green, or variegated with white and yellow. Timber white, used for cabinet-making and turnery purposes. Bark used for making birdlime. Wood sometimes dyed black and used as substitute for ebony. Average weight of wood per cubic foot, 47½ lb. One bushel of seeds will yield about 17,000 plants.

CULTURE OF GREENHOUSE SPECIES: Soil, two parts loam, one part peat and sand. Position, well-drained pots exposed to full light. Pot, March. Prune, Feb. Water freely in summer, occasionally other times. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 50°.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, well-drained shrubberies, banks, exposed slopes, etc., or near the sea. Plant, May or Sept. Hollies are not always easy to move and must be well watered and constantly damped overhead if dry weather follows transplanting. Prune or clip from May until July.

HEDGE CULTURE: Soil, ordinary, trenched 2 ft. deep and 3 ft. wide. Plant hollies (18 in. high) 18 in. apart in May or Sept.

PROPAGATION: By seed stratified and planted the following Oct. for common species; variegated kinds by budding on common species; grafting in March; cuttings of half-ripened side shoots with heel of older wood under bell-glass with slight bottom heat.

GREENHOUSE SPECIES CULTIVATED: *I. Cassine*, red berries, S. United States; *paraguariensis*, 'Paraguay Tea', 10 to 15 ft., Brazil.

HARDY SPECIES CULTIVATED: *I. Aquifolium*, 'Common Holly', 10 to 30 ft., red berries, Europe (Br.), and numerous horticultural forms including *bacciflora*, yellow fruit, *ferox*, 'Hedgehog Holly', leaves with short teeth and spines on surface, *heterophylla*, leaves entire, *pendula*, pendulous branches, *pyramidalis*, probably the best berrying var., *variegata*, leaves variegated with silver and gold; *cornuta*, 20 to 30 ft., red berries, China; *crenata*, small leaves, black berries, 5 ft., Japan; *glabra*, 'Ink Berry', unarmed leaves, black berries, 2 to 3 ft., U.S.A.; *latifolia*, large-leaved, 20 ft., tender in exposed places, Japan; *opaca*, 20 to 40 ft., U.S.A.; *Pernyi*, red berries, 15 to 30 ft., C. and W. China; *serrata*, deciduous, 10 ft., heavy crops of very small scarlet berries, Japan; *verticillata*, deciduous, red berries, 6 to 10 ft., Eastern N. America.

Illicium (Aniseed Tree)—*Magnoliaceae*. Slightly tender evergreen shrubs with fragrant flowers and leaves with an odour of aniseed. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts sandy loam and peat. Position, sheltered shrubberies or against south walls in S. of England, in pots in cold greenhouses elsewhere. Plant outdoors April, Sept. or Oct. Pot, Oct. Water plants in pots freely in summer, moderately in winter. Prune into shape, April or May.

PROPAGATION: By layers of young shoots in well-drained pots of sandy soil under bell-glass in temp. 55° to 65°, May to Aug.

SPECIES CULTIVATED: *I. anisatum* (syn. *I. religiosum*), yellowish-white, March to May, 4 ft., China and Japan; *floridanum*, purple-red, summer, 8 ft., Florida; *verum*, 'Star Anise', greenish-yellow, March to May, 4 ft., China.

Immortelles, see *Helichrysum*, *Xeranthemum* and *Helipterum*.

Impatiens—*Balsaminaceae*. Stove, greenhouse and hardy annuals and perennials.

CULTURE OF STOVE SPECIES: Compost, equal parts peat, loam, leaf-mould and sand. Position, well-drained pots in light part of stove Sept. to May; greenhouse, June to Sept. Pot., Feb. or March. Water moderately March to Sept., occasionally afterwards. Temp., Oct. to March 55° to 65°, March to June 65° to 75°. Prune into shape, Feb. May be grown in the flower garden during the summer.

CULTURE OF BALSAM (*I. Balsamina*): Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 65° to 75° in March or April. Transplant seedlings singly into 2 in. pots when 1 in. high. Compost, equal parts loam, leaf-mould and sand. Position, near glass in greenhouse, not shaded. Transfer from 2 in. into 5 in., and then into 6 and 8 in. pots. Apply liquid manure daily to plants showing flower. Water freely. Temp., March to June 55° to 65°. May be grown in flower garden during the summer. Plant, June. Soil, ordinary. Position, sunny borders.

CULTURE OF HARDY SPECIES: Sow seeds $\frac{1}{8}$ in. deep in April where plants are to grow. Soil, ordinary. Position, sunny borders. Thin seedlings to 6 in. apart when 1 in. high.

PROPAGATION: Stove species by seeds sown $\frac{1}{8}$ in. deep in light rich soil in temp. 65° in March; cuttings of side shoots inserted in small pots of light sandy soil in temp. 75° March to Aug.

STOVE SPECIES CULTIVATED: *I. auricoma*, yellow, summer, 2 ft., Comoro Isles; *grandiflora*, rosy-pink to purple, summer, 2 ft., Madagascar; *Hawkeri*, carmine, summer, 2 ft., Sunda Islands; *Holstii*, brick-red, summer, 3 ft., E. Trop. Africa; *Hookeriana*, white, summer, 2 ft., Ceylon; *keuensis*, orange-scarlet, summer, 2 ft., hybrid; *Marianiae*, purplish-red, summer, 2 ft., India; *mirabilis*, pink, succulent, spring, 3 to 4 ft., Trop. Africa; *Oliveri*, pale lavender, summer, 2 to 3 ft., Trop. Africa; *Petersiana*, rose, summer, 1½ ft., Trop. Africa; *platypetala*, rose, summer, 1½ ft., Java; *Sultanii*, scarlet, summer, 1 ft., Zanzibar. All perennials.

GREENHOUSE SPECIES CULTIVATED: *I. Balsamina*, 'Balsam', rose, scarlet, and white, summer, 2 ft., annual, Trop. Asia.

HARDY SPECIES CULTIVATED: *I. amphorata*, purple, Aug., 5 ft., Himalaya; *Noli-tangere* (syn. *I. Noli-me-tangere*), yellow, 1 to 1½ ft., annual, Europe; *Roylei* (syn. *I. glandulifera*), purple, summer, 6 ft., Himalaya.

Incarvillea—*Bignoniaceae*. Hardy herbaceous perennials. First introduced mid-nineteenth century.

OUTDOOR CULTURE: Soil, light, rich and well-drained. Position, sunny and sheltered borders. Plant in March or April. Protect crowns of the plant in winter by a covering of dry litter. Apply weak liquid manure occasionally in summer.

INDOOR CULTURE: Compost, two parts loam, one part of equal proportions of leaf-mould, decayed manure and silver sand. Position, fairly large pots, well drained, in cool or cold greenhouse. Pot in Oct. or March. Water freely in spring and summer; keep nearly dry in autumn and winter; give weak liquid manure occasionally in summer.

PROPAGATION: By seeds sown in a temp. of 55° in March, or in cold frame in April, and transplant seedlings outdoors in June. Sow also in Sept. in cold frame and plant out seedlings following April. Divide large plants in autumn.

SPECIES CULTIVATED: *I. Delavayi*, rose, summer, 2½ ft., China; *grandiflora*, rose, summer, 1½ to 2 ft., China, and var. *brevipes*, crimson; *Olgae*, purple, summer, 3 to 4 ft., Turkestan; *variabilis*, rose-purple, Aug., 18 in., W. China.

Incense Cedar, see *Libocedrus*; **-Juniper**, see *Juniperus thurifera*.

India Rubber Plant, see *Ficus elastica*.

Indian Azalea, see *Rhododendron Simsii*; **-Bean**, see *Catalpa bignonioides*; **-Corn**, see *Zea Mays*; **-Fern**, see *Ceratopteris*; **-Fig**, see *Opuntia Ficus*, var. *indica*; **-Hawthorn**, see *Raphiolepis indica*; **-Lilac**, see *Melia Azedarach*; **-Physic**, see *Gillenia trifoliata*; **-Paint-brush**, see *Castilleja californica*; **-Pink**, see *Dianthus chinensis*; **-Poke**, see *Phytolacca americana*; **-Shot**, see *Canna indica*.

Indigofera (Indigo)—*Leguminosae*. Stove, greenhouse and hardy evergreen and deciduous shrubs with pea-shaped flowers. First introduced early eighteenth century.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, equal parts turfy loam, leaf-mould and sand. Position, well-drained pots or beds. Pot or plant, Feb. or March. Prune into shape, Feb. or March. Water freely March to Oct., moderately other times. Temp. stove species, March to Oct. 65° to 75°, Oct. to March 55° to 65°; greenhouse, March to Oct. 55° to 65°, Oct. to March 45° to 55°; place plants outdoors June to Sept.

CULTURE OF HARDY SPECIES: Soil, ordinary rich, but not heavy. Position, well-drained bed or border in full sun, shoots may be trained against south wall. Plant, Oct. to Feb. Prune moderately after flowering, removing only those shoots that have flowered; those planted in open border will probably have to be cut to ground level annually in spring.

PROPAGATION: By seeds or cuttings in heat.

STOVE SPECIES CULTIVATED: *I. tinctoria*, red, summer, 4 to 6 ft., Tropics.

GREENHOUSE SPECIES CULTIVATED: *I. australis*, rose, spring, 4 ft., Australia.

HARDY SPECIES CULTIVATED: *I. Gerardiana*, racemes of rosy purple flowers, July to Sept., 4 to 8 ft., Himalaya; *hebeptala*, brownish crimson and rose, Aug. to Sept., 4 to 10 ft., N.W. Himalaya; *incarnata* (syn. *I. decora*), pretty dwarf species for rockery, white and pink, July to Aug., 18 in., China; *Kirilwii*, rose, July to Aug., 2 to 4 ft., N. China; *pendula*, wine-coloured, summer, 3 to 5 ft., W. China; *Potaninii*, very free flowering, pink, July to Sept., 4 to 5 ft., N.W. China.

Inkberry, see *Ilex glabra*.

Inula—*Compositae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary rich. Position, moist sunny beds or borders. Plant, Oct., Nov., March or April. Cut down flower stems in Oct. Top-dress with well-decayed manure in April.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in partially shady border outdoors in April; division of roots, Oct. or March.

SPECIES CULTIVATED: *I. acaulis*, yellow, spring and early summer, 2 in., Asia Minor; *ensifolia*, yellow, Aug., 10 in., S. Europe; *glandulosa*, yellow, Aug., 2 ft., Caucasus; *grandiflora*, yellow, July to Sept., 2 ft., Himalaya; *Helenium*, 'Elecampane', yellow, July to Sept., 6 to 8 ft., Europe; *Hookeri*, yellow, Aug. and Sept., 2 ft., Himalaya; *Oculus-Christi*, yellow, summer, 18 in., Europe; *Royleana*, deep golden-yellow, Aug. to Sept., 2 ft., Himalaya.

Ionopsidium—*Cruciferae*. Hardy annual. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, ordinary. Position, ledges of rockeries or as edgings to flower beds. Sow seeds where plants are to grow in April, just covering with fine soil.

POT CULTURE: Compost, any good mixture, not too light. Position, shady window, cold frame or greenhouse. Sow seeds $\frac{1}{16}$ in. deep in 5 in. pot well drained and filled with above compost, in April or Sept. Thin seedlings to 1 in. apart. Water moderately. Apply liquid manure occasionally when flower buds show.

SPECIES CULTIVATED: *I. acaule*, 'Carpet Plant', lilac, white and violet, summer, 3 in., Portugal.

Ionopsis—*Orchidaceae*. Epiphytic orchids. Pseudo-bulbs absent or very small, racemes simple or branched. Flowers not large but attractive.

CULTURE: Compost, osmunda fibre and sphagnum moss in equal parts. Position, in shallow pans suspended from roof. Repot Feb. or March. Water freely March to Sept., moderately other times. Syringe freely in summer, expose to light in autumn. Temp., Oct. to Feb. 55° to 60°, Feb. to Oct. 60° to 75° or higher.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *I. paniculata*, white, purple and yellow, winter, 6 in., Brazil; *teres* (syn. *I. pulchella*), white, shaded yellow, purplish on lip, summer, Brazil, W. Indies; *utricularioides*, white, rose-flushed, purple on lip, autumn, Trop. America.

Ipheion, see *Brodiaea*.

Ipomoea (Morning Glory)—*Convolvulaceae*. Stove, greenhouse and hardy perennial and half-hardy annual climbers. Some species formerly included here have been transferred to *Calonyction* and *Quamoclit*. First introduced late sixteenth century.

CULTURE OF STOVE SPECIES: Compost, equal parts fibrous loam, leaf-mould, decayed manure and silver sand. Position, pots, beds or borders in stove; shoots trained up roof, or on trellises. Pot or plant, Feb., March or April. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°. Water freely April to Sept., moderately afterwards. Prune straggling growths of perennials into shape, Feb. Sow three seeds of the annual species $\frac{1}{8}$ in. deep in a 2½ in. pot in temp. 65° in March. Transfer seedlings when 2 in. high into 5 in. pots. Train shoots to trellis or sticks.

CULTURE OF HALF-HARDY ANNUALS: Soil, light rich. Sow seeds $\frac{1}{8}$ in. deep in pots in temp. 65° in March. Transfer seedlings to cold frame in May. Plant, June. Position, sunny walls or borders; shoots trained to trellis or to sticks.

CULTURE OF HARDY PERENNIAL SPECIES: Soil, ordinary. Position, sunny walls, fences or arbours. Plant, Oct. or Nov.

CULTURE OF SWEET POTATO: Compost, two parts loam and one part decayed manure. Plant tubers singly in 6 in. pots in Feb., in temp. 65°, or 6 in. deep and 8 in. apart in prepared border in greenhouse. Water moderately Feb. to May, freely May to Sept., then give none, keeping tubers dry. Tubers are edible.

PROPAGATION: Annual species by seeds as above; perennials by cuttings of side shoots inserted in sandy peat under bell-glass in temp. 75° to 85°, March to Aug.,

or grafting in March; sweet potato by division of tubers in Feb.; *I. pandurata* by cuttings of young shoots in April.

STOVE SPECIES CULTIVATED: *I. Horsfalliae*, rose, winter, 10 to 15 ft., W. Indies; *Leari*, 'Blue Dawnflower', blue, summer, 10 ft., Trop. America; *paniculata* (syn. *I. digitata*) rose, 20 ft., Tropics; *tricolor* (syn. *I. rubro-caerula*), red, Mexico.

GREENHOUSE SPECIES CULTIVATED: *I. Batatas*, 'Sweet Potato', white, summer, 2 to 4 ft., tubers edible, Tropics.

HALF-HARDY SPECIES CULTIVATED: *I. hederacea*, blue or pale purple, summer, twining, Trop. America; *purpurea*, purple, summer, twining, Trop. America.

PERENNIAL SPECIES CULTIVATED: *I. pandurata*, 'Wild Sweet Potato Vine', white and purple, summer, climber, N. America.

Ipsea—*Orchidaceae*. Terrestrial, tuberous, deciduous orchid. Flowers, fragrant. First introduced mid-nineteenth century.

CULTURE: Compost, one part leaf-mould, three parts fibrous loam, one part chopped sphagnum moss and small crocks. Position, light part of cool or intermediate house. Pot, Feb. or March in well-drained pots. Water freely March to Aug., moderately Aug. to Oct., none afterwards. Temp., March to Sept. 60° to 65°, Sept. to March 50° to 55°. In Sept. expose to light.

PROPAGATION: Can seldom be effected, offsets from tubers are rare.

SPECIES CULTIVATED: *I. speciosa*, 'Daffodil Orchid', yellow, spring, 12 to 18 in., Ceylon.

Iresine—*Amarantaceae*. Stove and half-hardy plants with brilliantly coloured leaves. First introduced mid-nineteenth century.

POT CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, sunny part of stove. Pot, Feb. or March. Water freely March to Sept., moderately other times. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

OUTDOOR CULTURE: Soil, ordinary. Position, edgings to sunny beds or borders. Plant, June. Lift, repot and remove to stove in Sept. Pinch off points of shoots frequently to induce bushy growth.

PROPAGATION: By cuttings of young shoots inserted in pots or pans of light sandy soil in temp. of 65° to 75°, Feb., March, April, Sept. or Oct.

SPECIES CULTIVATED: *I. brilliantissima*, leaves red and crimson, 1 ft., Brazil; *Herbstii*, leaves maroon and crimson, 1 ft., Brazil, var. *aureo-reticulata*, leaves green, gold and red; *Lindenii*, leaves blood-red, 1 ft., Ecuador.

Iris—*Iridaceae*. Hardy evergreen rhizomatous and bulbous-rooted perennials. Sections: Tall Bearded, Dwarf Bearded, Beardless, Cushion, Japanese and Bulbous-rooted.

CULTURE OF TALL BEARDED SECTION: Soil, ordinary, well drained, and with plenty of lime or old mortar rubble. Position, sunny borders. Plant in July, Oct. or March, keeping rhizomes near surface. Top-dress with superphosphate of lime in April at the rate of 1 to 2 oz. per sq. yd. Lift and replant every fourth year.

CULTURE OF DWARF BEARDED SECTION: Soil, as above. Position, sunny well-drained borders. Plant and treat as advised for foregoing section.

CULTURE OF BEARDLESS SECTION: Moist soil and margins of ponds or streams for *I. versicolor*, *sibirica*, *ochroleuca* and *Pseudacorus*. Plant, Oct. or March. Cool, deep soil well supplied with humus and a partially shady position for *I. gracilipes*. Plant, March or April. Ordinary rich soil and sunny borders or rockeries for other species. Plant in Oct. or March.

CULTURE OF JAPANESE SECTION: Rich loamy soil on the margins of ponds, or in a half cask filled with loam and sunk in garden in sunny spot. Plant in Oct. or March. Apply liquid manure in growing season.

CULTURE OF CUSHION SECTION: Soil, light, rich loam with a liberal addition of old mortar rubble. Position, raised bed against a south wall. Plant in Oct. Protect by a cold frame or hand-light in winter. Lift rhizomes in July and store in dry sand in sunny shed or greenhouse until Oct.

CULTURE OF BULBOUS-ROOTED SECTION: Plant choice kinds in a compost of equal parts fibrous loam, leaf-mould and sharp sand. Place bulbs 3 in. deep and

3 in. apart. Plant in Aug. or Sept. Spanish and English kinds to be planted in ordinary soil in sunny beds or borders in Sept. or Oct., placing bulbs 3 in. deep and 6 in. apart. Lift and replant every third year.

POT CULTURE OF BULBOUS SPECIES: Compost, equal parts loam, leaf-mould and silver sand. Place in cold frame till growth begins, when remove to cold greenhouse or leave in frame to flower. Pot in Oct., placing five bulbs of the Spanish or English kinds, and *I. tingitana* in a 5 in. pot. Three bulbs of *I. reticulata* may be placed in a 3 in. pot. Give water only when growth has begun. Withhold water after leaves begin to decay. Spanish and English iris must not be placed in artificial heat. *I. tingitana* can be gently forced to flower from January onwards.

PROPAGATION: All the species by seeds in sandy soil in cold frame as soon as ripe; division of rhizomes immediately after flowering; offsets in autumn.

TALL BEARDED IRISES CULTIVATED: *I. albicans*, white, 2 to 3 ft., Spain; *Billiottii*, purple, white, and yellow, May to June, 3 ft., Asia Minor; *Cengialtii*, violet and orange, May, 18 in., Tyrol; *germanica*, 'Flag Iris', purple and lilac, fragrant, May, 2 to 2½ ft., S. Europe, and var. *florentina*, 'Orris Root'; *kashmiriana*, creamy white, lavender, or purple, May to June, 2 ft., Kashmir; *pallida*, lilac, purple, and white, May, fragrant, 3 ft., Southern Tyrol; *squalens*, lilac, purple and yellow, May, 3 ft., Europe, natural hybrid; *trojana*, purple and violet, 3 ft., Asia Minor; *variegata*, yellow and chestnut, May, 18 in., E. Europe. A large number of forms will be found described in trade lists.

DWARF BEARDED IRISES CULTIVATED: *I. aphylla*, purple, May, 9 to 15 in., E. Europe, a plant with many synonyms such as *biflora*, *bifurca*, *bohémica*, *breviscapa*, *extrastolacea*, *falcata*, *Fieberi*, *furcata*, *hungarica*, *nudicaulis*, *reflexa*, *rigida*, *Schmidtii* and *subtriflora*; *Chamaeiris*, yellow or purple, April, 4 to 6 in., S. Europe; *pumila*, 'Crimean Iris', lilac purple, April, 4 in., S. Europe, and its many vars., which range in colour from white to purple.

BEARDLESS IRISES CULTIVATED: *I. crocea* (syn. *I. aurea*) golden-yellow, June to July, 4 ft., Kashmir; *chrysographes*, violet purple, veined gold, 1½ to 2 ft., S.W. China; *confusa*, white tinged mauve and gold, 3 ft., China, often grown as *I. Wattii*; *cristata*, lilac, white, and orange, May, 6 to 12 in., S.E. United States; *ensata*, slate-blue or white, sometimes with a creamy ground, 18 in., Temp. Asia; *foetidissima*, 'Gladwin Iris', purple, June, 18 to 24 in., Britain; *brevicaulis* (syn. *I. foliosa*), blue, lavender, and greenish-white, June, 1 ft., S.E. United States; *Forrestii*, clear yellow, June, 18 in., N.W. Yunnan; *fulva*, coppery maroon, June to July, 18 to 24 in., banks of Mississippi near New Orleans; *gracilipes*, lilac pink, May, 9 to 12 in., Japan; *graminea*, blue and purple, June, 4 to 10 in., S. Europe; *Grant-Duffii*, sulphur yellow, May, 6 in., Palestine; *innominata*, deep yellow, 30 in., Oregon; *japonica* (syn. *I. fimbriata*), amethyst blue and gold, April, 18 in., Japan and China; *longipetala*, violet and white, June, 2 ft., California; *Milesii*, reddish purple with darker mottlings, June to July, 24 to 36 in., Himalaya; *Monnierii*, lemon yellow, fragrant, June, 3 ft., Crete; *monspur*, lilac blue, June, 4 ft., hybrid; *ochroleuca*, white and yellow, June to July, 4 to 5 ft., Western Asia Minor; *orientalis*, blue-purple, May to June, 1½ to 2 ft., Manchuria and Japan; *Pseudacorus*, 'Yellow Water Flag', yellow, May and June, 3 ft., Britain; *setosa*, purplish blue, May, 8 to 24 in., N. Siberia, Japan, Alaska and Labrador; *sibirica*, blue and white, May and June, 3 ft., Cent. Europe and Russia; *spuria*, blue to reddish purple, June, 3 ft., Europe; *lectorum*, 'Japanese Roof Iris', lilac or blue-purple, 1 ft., Cent. and S.W. China; *unguicularis* (syn. *I. stylosa*), 'Algerian Iris', lavender blue, Jan. and Feb., 1 ft., Algeria; *verna*, lilac blue, fragrant, April to May, 3 in., N. America; *versicolor*, purple, May to June, 2 ft., E. Canada and Eastern U.S.A.; *Wattii*, pale lavender, 3 to 6 ft., China; *Wilsonii*, yellow, June, 2 ft., China. Here also numerous vars. exist which may be found in trade lists.

CUSHION IRISES CULTIVATED: *I. Barnumiae*, vinous red, May, 2 to 6 in., N.E. Asia Minor; *Bismarckiana*, purple, yellow, blue, and white, May, 12 to 15 in., Mt. Lebanon; *Gatesii*, grey, purple, and white, May, 12 to 18 in., Kurdistan; *Hoogiana*, grey-blue or blue-purple, May, 18 to 24 in., Turkistan; *iberica*, lilac,

white, and purple, May, 6 in., Caucasus; *Korolkowii*, creamy white and olive green, May, 1 ft., Turkistan; *Lortetii*, crimson and cream, May, 1 ft., S. Lebanon; *paradoxa*, blue-purple, white, and purplish black, May, 4 to 6 in., Persia; *susiana*, 'Mourning Iris', brown, black, and lilac, May, 1 ft., habitat uncertain.

JAPANESE IRISES CULTIVATED: *I. Kaempferi*, reddish purple and yellow, June to July, 18 to 30 in., Manchuria, Korea and Japan; *laevigata*, blue-purple, June, 15 to 18 in., E. Siberia, Manchuria and Korea.

BULBOUS-ROOTED IRISES CULTIVATED: *I. alata*, lilac purple and yellow, Oct., 1 ft., S. Europe; *Aucheri* (syn. *I. sindjarensis*), azure blue and pale yellow, Feb. and March, 9 to 12 in., Mesopotamia; *Bakeriana*, white, violet, and blue, fragrant, Jan., 6 to 12 in., Almeria; *bracteata*, yellow and purple, May, 4 to 6 in., Oregon; *bucharica*, white and yellow, April, 12 to 18 in., Bokhara; *filifolia*, red-purple, blue, and orange, June, 10 to 15 in., S. Spain and N. Africa; *Graebiana*, mauve and cobalt blue, March and April, 6 to 12 in., Turkistan; *Histrio*, bright blue and yellow, Dec. and Jan., 1 ft., Asia Minor; *histrioides*, blue-purple, white, and yellow, Jan., 1 ft., N. Asia Minor; *orchioides*, yellow, April, 9 in., Turkistan; *persica*, white, greenish blue, purple, and orange, Feb., 1 to 2 in., Persia; *reticulata*, violet, purple and yellow, violet scented, Feb., 6 in., Caucasus; *tingitana*, lilac blue, deep blue, and yellow, March, 2 ft., Tangier; *Vartanii*, slate grey or white, Dec. and Jan., 6 to 12 in., Nazareth; *xiphioides*, 'English Iris', various colours, 1 to 2 ft., Pyrenees; *Xiphium*, 'Spanish Iris', various colours, June, 1 to 2 ft., S. Europe and N. Africa. The plant known in gardens as *Iris pavonia* is actually *Moraea pavonia*, q.v.

Irish Heath, see *Daboecia cantabrica*.

Ironweed, see *Vernonia*.

Ironwood, see *Ostrya virginiana*.

Isoetes (Quillwort)—*Isoetaceae*. Rush-like plants sometimes used in the water garden.

CULTURE: Soil, sandy loam. Position, pond margin, or submerged forms in very deep water. Plant, spring.

PROPAGATION: By division.

SPECIES CULTIVATED: *I. lacustris*, tufts of quill-like leaves, for cold water aquariums, or may be used as an oxygenator in deep clear-water pools, N. Temp. Regions including Britain.

Isoloma—*Gesneriaceae*. Stove flowering tuberous-rooted plants. The plants formerly known as *Tydaea*s are now merged in this genus.

CULTURE: Compost, two parts fibrous peat, one part loam, one part leaf-mould, with a little decayed manure and silver sand. Position, well-drained pots or pans in shady part of plant stove. Pot, March to flower in summer, May to flower in autumn, June to flower in winter. Place tubers 1 in. deep singly in 5 in. pots, or 1 to 2 in. apart in larger sizes. Water moderately from time growth begins until plants are 3 or 4 in. high, then freely. After flowering, gradually withhold water till foliage dies down, then keep dry till potting time. Apply weak liquid manure once or twice a week when flower buds show. Syringing not required. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 65°. When foliage has died down, store on their sides under stage till potting time in temp. of 50° to 55°.

PROPAGATION: By seeds sown on surface of well-drained pots of sandy peat, in temp. 75°, March or April; cuttings of young shoots inserted in pots of sandy peat in temp. 75° to 85° in spring; fully matured leaves pegged on surface of pots of sandy peat in temp. 75° to 85°.

SPECIES CULTIVATED: *I. amabile*, rose and purple, 1 to 2 ft., Colombia; *bogotense*, yellow and red, 1 to 2 ft., origin unknown; *digitaliflorum*, rose, purple, and white, winter, 1 ft.; *hirsutum*, crimson spotted white, rose and purple, 2 to 3 ft., W. Indies; *hondense*, yellow and red, winter, 1 ft., New Grenada; *Lindenii* (syn. *Tydaea Lindenii*), white and violet, winter, 1 ft., Ecuador.

Isopyrum—*Ranunculaceae*. Hardy herbaceous perennial with finely divided foliage, somewhat like maidenhair fern. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, sunny or shady rockery, bed or border. Plant, Oct. or March.

PROPAGATION: By seeds outdoors in April or May; division of roots in Oct. or Nov.

SPECIES CULTIVATED: *I. thalictroides*, white, spring, 8 in., Europe. See also *Paraquilegia*.

Isotoma—*Lobeliaceae*. Greenhouse flowering perennial. Formerly included in the genus *Lobelia*. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, pots or baskets in shady part of greenhouse. Pot, March to July. Water freely in summer, moderately other times. Feed with stimulants when plants are well rooted in final pots.

PROPAGATION: By seeds sown thinly on the surface of sandy soil in temp. 60° in Feb. or March. Cuttings of young shoots inserted in pots of sandy soil in gentle heat in spring or autumn.

SPECIES CULTIVATED: *I. axillaris*, blue, 1 ft., autumn, Australia, and var. *subpinnatifida*.

Itea—*Saxifragaceae* (or *Escalloniaceae*). Evergreen and deciduous flowering shrubs. First introduced early eighteenth century.

CULTURE: Soil, peaty. Position, moist sheltered shrubberies. Plant, Oct. to Feb. Prune moderately after flowering.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in sandy soil outdoors in April; suckers removed in Oct. or Nov.; cuttings in August in sandy soil and given close treatment and gentle bottom heat.

SPECIES CULTIVATED: *I. ilicifolia*, 9 in. pendulous racemes of greenish-white flowers in August, evergreen, rather tender, 8 to 15 ft., W. China; *virginica*, 'Virginian Willow', erect racemes, creamy-white fragrant flowers, July, 5 ft., hardy, deciduous, Eastern U.S.A.

Italian Corn Salad, see *Valerianella eriocarpa*; **-Starwort**, see *Aster Amellus*.

Ivy, see *Hedera*.

Ixia (African Corn Lily)—*Iridaceae*. Half-hardy bulbous plants with fragrant flowers. First introduced early eighteenth century.

OUTDOOR CULTURE: Soil, light, rich, sandy. Position, sunny well-drained border. Plant, Sept. to Jan., placing bulbs 4 in. deep and 2 in. apart. Lift and replant bulbs annually. Mulch surface of bed in March with cow manure.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed cow manure. Pots, 4½ in. in diameter, well drained. Place five bulbs, 3 in. deep, in each pot in Nov., and cover with coconut-fibre refuse in cold frame or under cool greenhouse stage until growth begins. Water moderately from time bulbs begin to grow until flowers fade, then gradually cease, keeping bulbs dry till Jan. Temp., Sept. to March 40° to 50°, other times 50° to 60°.

PROPAGATION: By offsets, treated as advised for bulbs.

SPECIES CULTIVATED: *I. flexuosa*, pink, spring, 1 ft., S. Africa; *campanulata* (syn. *I. speciosa*), purple and crimson, summer, 1 ft., S. Africa; *maculata*, orange yellow, spring, 1 ft., S. Africa; *patens*, pink, spring, 1 ft., S. Africa; *viridiflora*, green, spring, 1 ft., S. Africa.

Ixiolirion—*Amaryllidaceae*. Half-hardy bulbous plant. First introduced early nineteenth century.

CULTURE: Soil, light sandy loam. Position, well-drained sunny border at foot of south wall. Plant bulbs 3 in. deep and 4 in. apart in March. Mulch surface of bed with cow manure in April. After flowering cover with bell-glass or hand-light to ensure thorough ripening of bulbs. Lift bulbs in Sept. and store in dry sand in cool, frost-proof place till planting time.

PROPAGATION: By offsets removed at any time, planted and treated as advised for normal bulbs. May also be grown in pots as advised for *Ixias*.

SPECIES CULTIVATED: *I. montanum*, blue, June, 1 ft., W. Asia.

Ixora—Rubiaceae. Stove flowering evergreen shrubs with fragrant flowers. First introduced late seventeenth century.

CULTURE: Compost, two parts good fibrous peat, one part fibrous loam and silver sand. Position, shady part of stove whilst growing, light situation when at rest. Pot, Feb. or March; good drainage indispensable. Prune into shape in Feb. Water freely March to Sept., moderately afterwards. Syringe twice daily March to Aug. Apply liquid manure once or twice a week to healthy plants in flower. Temp., March to Sept. 75° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings of firm young shoots 2 to 3 in. long, inserted singly in small pots in sandy peat under bell-glass in temp. 75° to 85°, March to May.

SPECIES CULTIVATED: *I. acuminata*, white, summer, 3 to 5 ft., Himalaya; *coccinea*, orange-scarlet, summer, 3 to 4 ft., India; *congesta*, orange, summer, 4 ft., Burma, Malaya; *lutea*, yellow, summer, 3 to 4 ft., origin unknown; *macrothyrsa* (syn. *I. Duffii*), deep red, tinged crimson, summer, 10 to 12 ft., Sumatra; *splendens*, coppery-scarlet, 4 ft., origin unknown; *stricta*, light orange, summer, 2 to 3 ft., China. Numerous vars. and hybrids.

Jaborosa—Solanaceae. Half-hardy herbaceous perennial. First introduced early nineteenth century.

CULTURE: Soil, rich loamy. Position, well-drained border at base of south wall. Plant, Oct. to March. Protect in winter with covering of ashes or litter.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light sandy soil in well-drained pots in temp. 55° to 65° in March or April; cuttings of young shoots inserted in sandy soil under bell-glass, hand-light, or in cold frame, July to Sept.; division of creeping stems in March or April.

SPECIES CULTIVATED: *J. integrifolia*, white, summer, 9 in., Buenos Ayres.

Jacaranda—Bignoniaceae. Stove evergreen flowering tree with downy, fern-like leaves. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, fibrous loam and silver sand. Position, well-drained pots in light part of plant stove Sept. to April, sunny place outdoors July to Sept. Pot, Feb. to March. Prune into shape, Feb. Water freely March to Oct., moderately Oct. to March. Temp., Sept. to March 55° to 65°, March to July 70° to 80°. Plants form decorative specimens when 1 to 3 ft. high; flowering specimens when grown as standards, 10 to 15 ft. high.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light sandy peat in well-drained pots under bell-glass in temp. of 75° to 85°, Feb. to June; cuttings of firm shoots inserted in sandy peat under bell-glass in temp. of 75°, June to Sept.

SPECIES CULTIVATED: *J. acutifolia* (syns. *J. mimosaefolia*, *J. ovalifolia*), blue, to 50 ft., Brazil.

Jack-go-to-bed-at-noon, see *Ornithogalum umbellatum*; **-in-prison**, see *Nigella damascena*; **-fruit**, see *Artocarpus integra*.

Jacobaea, see *Senecio elegans*.

Jacobeian Lily, see *Sprekelia formosissima*.

Jacobinia—Acanthaceae. Stove flowering plants. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, well-drained pots in light stove Sept. to June, sunny frame June to Sept. Pot, March to April. Water moderately Sept. to March, freely other times. Temp., Sept. to March 55° to 65°, March to June 65° to 75°. Prune shoots to 1 in. of base after flowering. Nip off points of young shoots occasionally, May to Aug., to induce bushy growth. Apply liquid or artificial manure twice a week to plants in flower.

PROPAGATION: By cuttings of young shoots inserted singly in small pots or sandy soil under bell-glass in temp. 75°, March to July.

SPECIES CULTIVATED: *J. carnea*, flesh-coloured, Aug. and Sept., 3 to 4 ft., Brazil; *chrysostephana*, yellow, winter, 3 ft., Mexico; *Ghiesbreghtiana* (syn. *Justicia Ghiesbreghtiana*), scarlet, Dec., 2 ft., Mexico; *pauciflora* (syn. *Libonia pauciflora*), scarlet and yellow, winter, 2 ft., Brazil; *Pophliana*, pink, 4 ft., Sept., Brazil, and var. *velutina*; *suberecta*, orange, 1 ft., summer, Uruguay.

Jacob's Ladder, see *Polemonium caeruleum*; **-rod**, see Asphodeline.

Jalap, see *Mirabilis Jalapa*.

Jamesia—*Saxifragaceae* (or *Hydrangeaceae*). Hardy deciduous flowering shrub. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny rockeries or borders. Plant, Oct. to Feb. Prune directly after flowering.

PROPAGATION: By cuttings inserted under hand-light or in cold frame in autumn.

SPECIES CULTIVATED: *J. americana*, white, spring, mildly fragrant, 6 to 8 ft., Rocky Mountains.

Japanese Cedar, see *Cryptomeria japonica*; **-Laurel**, see *Aucuba japonica*; **-Maple**, see *Acer palmatum*; **-Pagoda Tree**, see *Sophora japonica*; **-Snowflower**, see *Deutzia gracilis*; **-Windflower**, see *Anemone hybrida*.

Jasione (Sheep's-bit Scabious)—*Campanulaceae*. Hardy biennials and herbaceous perennials.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, well-drained sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in April or Sept. where plants are to grow.

CULTURE OF PERENNIAL SPECIES: Soil, good light loam. Position, sunny well-drained borders. Plant, March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil outdoors, April to Sept.; division of roots, March.

ANNUAL SPECIES CULTIVATED: *J. montana*, lilac blue, summer, 1 ft., Europe (Br.).

PERENNIAL SPECIES CULTIVATED: *J. humilis*, blue, July to Aug., 6 in., Pyrenees; *Jankae*, blue, July to Sept., 9 to 12 in., E. Europe; *perennis*, blue, June, 18 in., W. Europe.

Jasmine, see *Jasminum*; **-Nightshade**, see *Solanum jasminoides*.

Jasminum (Jasmine; Jessamine)—*Oleaceae*. Tender and hardy climbing and trailing, shrubby, flowering plants; mostly evergreen. First introduced mid-eighteenth century.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, equal parts loam, peat and leaf-mould, with little sand. Position, well-drained pots, beds or borders with shoots trained to walls, rafters or trellis. Pot or plant, Feb. or March. Prune moderately in Feb. Water freely March to Oct., moderately afterwards. Temp. stove species, March to Sept. 65° to 75°, Sept. to March 55° to 65°, syringe daily Mar. to Aug.; greenhouse species, March to Sept. 45° to 55°, March to June 55° to 65°, sunny place outdoors June to Sept.

CULTURE OF HARDY AND SLIGHTLY TENDER SPECIES: Soil, ordinary, rich. Position, well-drained borders at base of south or south-west walls. Plant, Oct., Nov., Feb. or March. Prune moderately after flowering, only removing shoots that have flowered.

PROPAGATION: Stove and greenhouse species by cuttings of firm shoots in well-drained pots of sandy peat under bell-glass in temp. 65° to 75°, March to Sept. Hardy species by cuttings of shoots 3 to 6 in. long in pots of sandy soil in cold frame or in sheltered borders outdoors, Sept. to Dec.; layering in spring or summer.

STOVE SPECIES CULTIVATED: *J. gracillimum*, white, winter, 4 ft., Borneo; *Sambac*, 'Arabian Jasmine', white, autumn, 6 ft., Trop. Asia.

GREENHOUSE SPECIES CULTIVATED: *J. officinale grandiflorum*, white, autumn, 10 ft., Malaya; *Mesnyi* (syn. *J. primulinum*), yellow, winter, 6 to 10 ft., China.

HARDY AND SLIGHTLY TENDER SPECIES CULTIVATED: *J. Beesianum*, strong-growing deciduous climber, fragrant rose-coloured flowers, June to July, shining black berries, W. China; *floridum*, half-evergreen loose-growing shrub better for wall protection, 4 to 8 ft., bright yellow, July to Sept., China; *Giraldii*, deciduous shrub, 5 ft., large downy leaves, yellow flowers, summer, Cent. China; *humile*, half-evergreen low shrub to 4 ft., yellow, July to Aug., W. China; *nudiflorum*, 'Winter Jasmine', deciduous, hardy, yellow, Nov. to March, best trained to wall, any aspect, China; *officinale*, 'Common Jasmine', vigorous deciduous climber to 30 ft., better for wall protection in cold districts, white, very fragrant, June to Oct., Persia, Kashmir and China; *stephanense*, hybrid, pink, June to July, black fruits.

Jeffersonia—*Berberidaceae*. Hardy perennial herb. First introduced late eighteenth century.

CULTURE: Soil, peaty. Position, shady edges of rockery or borders. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in cold frame, July to Sept.; division of roots, Oct. or March.

SPECIES CULTIVATED: *J. diphylla*, 'Twin Leaf' (syn. *J. binata*), white, spring, 6 in., N. America; *dubia* (syn. *Plagiorhegma dubium*), deep lilac, spring, 9 in., Asia Minor.

Jerusalem Artichoke, see *Helianthus tuberosus*; **-Cherry**, see *Solanum Pseudo-Capsicum*; **-Cross**, see *Lychnis chalcedonica*; **-Sage**, see *Phlomis fruticosa*.

Jessamine, see *Jasminum*.

Jewel Orchid, see *Anoechtochilus*.

Jew-bush, see *Pedilanthus tithymaloides*.

Jew's Mallow, see *Kerria japonica*.

Job's Tears, see *Coix Lacryma-Jobi*.

Jonquil, see *Narcissus Jonquilla*.

Judas Tree, see *Cercis Siliquastrum*.

Juglans (Walnut)—*Juglandaceae*. Hardy deciduous nut-bearing trees. First introduced late sixteenth century.

CULTURE OF WALNUT: Soil, sandy and calcareous, or stiff loams on gravelly subsoil. Position, S. or S.W., open, not shaded by trees or buildings. Plant, Oct. or Nov., placing roots 3 to 4 in. below surface of ground previously deeply trenched. Pruning unnecessary. Gather nuts for pickling before shell gets too hard. Place ripe nuts in thin layers in dry position till husks fall off, then pack in alternate layers with sand in barrels or casks, or sprinkled with salt in jars. Grafted or budded trees bear earlier than seedlings. Culture of other species, same as above. Walnuts planted for fruit production should be grafted specimens of named vars. of known cropping powers. Thus for pickling during July, kinds such as Leeds Castle, which bears in clusters, should be selected. For dessert, French types such as Mayette and Parisienne are best. *J. regia maxima* is the 'Double Walnut'.

USEFUL DATA: *Juglans regia* and *nigra* good for town gardens. Timber used for making gun stocks, furniture and veneering. One bushel of nuts will yield about 5,000 seedlings. Average life of a walnut tree, 300 years. Average weight of timber per cubic foot, 47 lb.

PROPAGATION: By seed (nuts) sown 2 in. deep in light soil outdoors in Nov., transplanting seedlings following Oct.; budding in Aug.; grafting in March for named vars. which do not come true from seed.

SPECIES CULTIVATED: *J. cinerea*, 'Butter-nut', 50 to 60 ft., N. America; *nigra*,

'Black Walnut', 80 to 100 ft., N. America; *regia*, 'Walnut', 50 to 60 ft., Caucasus to Himalaya.

Juncus (Rush)—*Juncaceae*. Hardy bog-plants.

CULTURE: Soil, ordinary. Position, wet ground or pond margin. Plant, spring or autumn.

PROPAGATION: By division.

SPECIES CULTIVATED: *J. effusus*, 18 in., stems twisted in corkscrew fashion, N. America, Europe, Asia, var. *spiralis*; *follicularis*, 2 ft., variegated stems, var. *variegatus*.

Jujube, see *Zizyphus Jujuba*

June-berry, see *Amelanchier canadensis*

Juniperus (Juniper)—*Pinaceae* (or *Cupressaceae*). Hardy evergreen coniferous trees. Habit, pyramidal or bushy. Leaves, needle-shaped, narrow, scale-like.

CULTURE: Soil, good ordinary. Position, open, well-drained shrubberies or lawns for erect species, rockeries or banks for dwarf species. Plant, Sept., Oct. or April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in beds of light soil in cold frame in April, transplanting seedlings singly into small pots when 2 in. high and planting outdoors a year afterwards; cuttings of young branches inserted in sandy soil in cold frame or under hand-light in Sept. or Oct.

SPECIES CULTIVATED: *J. chinensis*, to 60 ft., China and Japan, and vars. *aurea*, upright growth, young shoots gold, *Pfitzeriana*, wide horizontal spreading branches for covering banks or large rocks, *Sargentii*, a prostrate form with creeping stems for the rockery, *variegata*, compact growth, tipped creamy white, also numerous dwarf forms such as *globosa*, *japonica* and *plumosa*; *communis*, 'Common Juniper', 30 to 40 ft., Europe, and vars. *hibernica*, 'Irish Juniper', and *compressa*, very dwarf; *excelsa*, pyramidal habit, 30 to 40 ft., Asia Minor, and var. *stricta*, upright growing; *Sabina*, 'Savin', 5 to 10 ft., Europe and N. America, and var. *tamariscifolia*, spreading habit; *squamata*, 2 ft., Himalaya and China, and var. *Meyeri*, dense habit and metallic blue colouring; *thurifera*, 'Incense Juniper', 30 to 40 ft., S.W. Europe and N. Africa; *virginiana*, 'Red Cedar', 40 to 50 ft., N. America, and vars. *bedfordiana*, columnar, *aureo-variegata*, golden variegated, *glauca*, blue foliage, *pendula*, branches drooping, and *Schottii*, columnar habit, bright green foliage.

Jupiter's Beard, see *Anthyllis Barba-Jovis*.

Jussiaea (Primrose Willow)—*Onagraceae*. Bog and water plants, mostly tender, with yellow Oenothera-like flowers. First introduced early nineteenth century.

CULTURE: Soil, any good loam. Position, sunny, in shallow water. Plant, spring.

PROPAGATION: By seeds sown in shallow pans of loam and charcoal and submerged just below water level, or cuttings struck in a sandy compost, kept very damp.

SPECIES CULTIVATED: *J. grandiflora*, hardy in the south, 1 ft., Carolina; *peruviana* (syn. *J. Sprengeri*), evergreen, 5 to 6 ft., tender, woolly leaves, S. America; *repens*, hardy, creeping, large flowers, N. America; *suffruticosa*, 2 to 3 ft., reddish stems, tender, S. America.

Justicia, see *Jacobinia Ghiesbreghtiana*.

Kadsura—*Magnoliaceae*. Slightly tender, evergreen, climbing, flowering shrub. First introduced mid-nineteenth century.

CULTURE: Soil, peaty. Position, well-drained borders against south or west walls in warm districts only. Plant, Sept., Oct. or April. Prune straggling shoots moderately in April.

PROPAGATION: By cuttings of firm shoots 2 to 3 in. long, inserted in silver sand under bell-glass in cold greenhouse or frame, July to Oct.

SPECIES CULTIVATED: *K. japonica*, yellowish-white, June to Sept., followed by scarlet berries, climbing, Japan and Korea, and var. *variegata*, leaves variegated, creamy white.

Kaempferia—*Zingiberaceae*. Stove herbaceous perennial with fragrant flowers. First introduced early eighteenth century.

CULTURE: Compost, equal parts fibrous loam and peat with little silver sand and charcoal. Position, well-drained pots in light part of stove during growing period; on their sides under staging in dry part of house during resting period. Pot, Feb. or March. Water freely March to Sept., keep almost dry afterwards. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 60°. Growing period, Feb. to Oct. Resting period, Oct. to Feb.

PROPAGATION: By division of rootstocks in Feb.

SPECIES CULTIVATED: *K. Gilbertii*, leaves variegated white and green, 1 ft., Burma; *Kirkii*, rosy purple, Aug., 6 in., Zanzibar; *ornata*, yellow and orange, July, Borneo; *Roscoeana*, white and reddish-violet, July to Aug., Burma; *rotunda*, white and violet, Aug., 1 ft., India.

Kaffir Lily, see *Clivia* and *Schizostylis*.

Kaki, see *Diospyros Kaki*.

Kalanchoe—*Crassulaceae*. Greenhouse succulent perennial plants with fragrant flowers. First introduced late eighteenth century.

CULTURE: Compost, equal parts sandy loam, brick rubble, dried cow manure and river sand. Position, well-drained pots in light greenhouse, close to glass. Pot, March. Water freely April to Aug., moderately Aug. to Nov., very little afterwards. Prune old plants after flowering, shortening shoots to 1 in., and repot when new shoots are 1 in. long. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°.

PROPAGATION: By seeds sown in well-drained pots or pans of sandy soil, just covered with fine soil, in temp. 60° to 70° in March or April, seedlings to be kept close to glass and have little water; cuttings of shoots 2 to 3 in. long exposed to sun for few days, then inserted in June, July or Aug. in well-drained pots of sandy soil, placed on greenhouse shelf, and given very little water, leaves laid on surface of moist sand.

SPECIES CULTIVATED: *K. Bentii*, pink and white, June, 3 ft., Arabia; *Blossfeldiana*, scarlet, summer, 1 ft., Madagascar; *flammea*, orange-scarlet, summer, 2 ft., Somaliland; *marmorata*, white, summer, 2 ft., Abyssinia; *pinnata* (syns. *Bryophyllum calycinum*, *B. pinnatum*), green and purple, summer, 3 ft., Tropics; *Schimperiana*, white, May, 2 ft., Abyssinia; *thyrsiflora*, yellow, May to June, 2 ft., S. Africa; *verticillata* (syn. *Bryophyllum tubiflorum*), salmon, winter, 3 ft., S. Africa, notable for plantlets formed on the slender, mottled leaves.

Kale, Scotch, see *Brassica fimbriata*; **Field-**, see *B. oleracea* var. *acephala*.

Kalmia—*Ericaceae*. Hardy evergreen or deciduous flowering shrubs with clusters of waxy, rose or pink blossoms in late spring. First introduced early eighteenth century.

CULTURE: Soil, sandy peat and leaf-mould free from lime or chalk. Position, moist and cool, partially shaded. Plant, Sept., Oct., April or May. Pruning unnecessary. Foliage of *K. latifolia* poisonous to cattle.

POT CULTURE: Compost, two parts sandy peat, one part leaf-mould and sand. Position, well-drained pots in greenhouse (temp. 45° to 55°) from Nov. to May; sunny place outdoors afterwards. Water moderately in winter, freely other times.

PROPAGATION: By seed sown in April or Oct., $\frac{1}{16}$ in. deep, in well-drained shallow pans of sandy peat in cold frame; cuttings of young shoots inserted in pots of sandy peat under bell-glass in shady cold frame, April to Aug.; layers in spring.

SPECIES CULTIVATED: *K. angustifolia*, 'Sheep Laurel', crimson, June, 3 ft., evergreen, N. America, and vars. *nana*, dwarf, *rosea*, pink, and *rubra*, red; *cuneata*, white, June to July, 3 to 4 ft., deciduous or partially evergreen, South-eastern

U.S.A.; *glauca*, lilac purple, May, 2 ft., N. America; *latifolia*, 'Calico Bush', 'American Laurel', 'Mountain Laurel', the best species for general cultivation, beautiful clear rose-pink, June, 6 to 10 ft., N. America, and var. *myrtifolia*, a good dwarf form for a confined space.

Kalmiopsis—*Ericaceae*. Hardy evergreen dwarf shrub, beautiful and uncommon. First introduced early twentieth century.

CULTURE: Soil, as for *Kalmia*. Position, in the rockery or heath garden, full sun or very slight shade. No pruning.

PROPAGATION: By cuttings, July or August, in acid, sandy soil, kept in close conditions.

SPECIES CULTIVATED: *K. Leachiana*, to 15 in., small *Kalmia*-like blossoms of bright pink, June onwards, N.W. and N. America.

Karatas—*Bromeliaceae*. Stove flowering evergreen foliage plant. Bracts, green, red or crimson. Leaves, strap-shaped, green above, purplish or whitish beneath, spiny. First introduced early eighteenth century.

CULTURE: Compost, equal parts fibrous loam, rough peat, leaf-mould and silver sand. Position, well-drained pots in light, moist part of stove. Pot, Feb. or March. Water moderately in winter, freely at other times. Temp., March to Sept. 70° to 80°, Sept. to March 65° to 75°.

PROPAGATION: By large-sized offshoots inserted singly in small pots of sandy peat, in temp. of 85°, Feb. or April.

SPECIES CULTIVATED: *K. Plumieri*, purple, summer, 18 in., Trop. America. See also *Aregelia*, *Canistrum* and *Nidularium*, as many species formerly included in *Karatas* are now placed in these genera.

Kenilworth Ivy, see *Cymbalaria muralis*.

Kelseya—*Rosaceae*. Hardy evergreen perennial cushion plants.

CULTURE: Good, well-drained soil with ample sharp grit, full sun. Probably best grown in alpine house or cold frame.

PROPAGATION: By seeds, if obtainable, or by carefully made small cuttings of side growths in spring and early summer.

SPECIES CULTIVATED: *K. uniflora*, pink, $\frac{1}{2}$ in., summer, N. America.

Kennedia—*Leguminosae*. Greenhouse flowering and twining evergreen plants. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat and loam, little silver sand. Position, pots, with shoots trained to trellis, or planted out in beds, and shoots trained up rafters. Pot or plant, Feb. or May. Water freely March to Sept., moderately at other times. Prune straggling plants into shape in Feb. Apply weak stimulants occasionally to healthy plants in flower. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in well-drained pots of light sandy soil in temp. of 55° to 65° in March or April; cuttings of firm young shoots, 2 to 3 in. long, inserted in well-drained pots of sandy peat under bell-glass in temp. 55° to 65°, March to July.

SPECIES CULTIVATED: *K. coccinea*, scarlet, summer, 10 to 15 ft., Australia; *nigricans*, purple-black and green, large climber, Australia; *prostrata*, 'Coral Creeper', scarlet, spring, prostrate, Australia; *rubicunda*, dark red, May, 10 to 15 ft., Australia. See also *Hardenbergia*.

Kentia, see *Howea*.

Kerria (Jew's Mallow)—*Rosaceae*. Hardy deciduous flowering shrub First introduced early eighteenth century.

CULTURE: Soil, good ordinary. Position, against south, west or even north walls or fences, or in mixed shrubberies. Plant, Oct. to March. Prune in May or June, cutting off old or weak shoots only.

POT CULTURE: Compost, two parts loam, one part leaf-mould and sand. Pot, Oct. Place in cold greenhouse and water moderately. After flowering place

plants in sunny position outdoors till Oct. Forcing: place plants in temp. 55° to 65° in Jan. Water moderately. Transfer plants to sunny position outdoors after flowering.

PROPAGATION: By cuttings of young shoots, 2 to 3 in. long, in sandy soil under bell-glass or in cold frame in summer; layering shoots in spring.

SPECIES CULTIVATED: *K. japonica* (syn. *Corchorus japonicus*), yellow, May, 6 to 10 ft., China, and var. *pleniflora*, double, golden yellow; there is a variegated form which is partially tender, requiring a protected position. See also *Rhodotypos*.

Kickxia—*Scrophulariaceae*. Annual creeping herbs, sometimes planted for ground-cover in rockeries, formerly included in *Linaria*.

CULTURE: Soil, ordinary. Position, rockeries. Plant, autumn or spring.

PROPAGATION: By division; seed.

SPECIES CULTIVATED: *K. Elatine* (syn. *Linaria Elatine*), yellowish, purple outside, summer, creeping, Europe (Br.); *spuria* (syn. *Linaria spuria*), yellowish, upper lip purple, summer, creeping, Europe (Br.).

Kidney Bean, see *Phaseolus vulgaris*; **-bean Tree**, see *Wisteria sinensis*; **-Vetch**, see *Anthyllis Vulneraria*.

Kingcup, see *Caltha palustris*.

King's Spear, see *Asphodeline lutea*.

Kirengeshoma—*Saxifragaceae*. One hardy, herbaceous perennial.

CULTURE: Soil, rich, leafy or peaty, moist. Position, cool, partially shaded beds or borders. Plant, March or April.

SPECIES CULTIVATED: *K. palmata*, yellow, Aug. to Oct., 3 to 4 ft., Japan.

Kitaibelia—*Malvaceae*. Hardy perennial herb with vine-like foliage. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open, large border or shrubbery. Plant, Oct. or April.

PROPAGATION: By division of roots in Oct. or April; seeds sown outdoors in April.

SPECIES CULTIVATED: *K. vitifolia*, white and rose, summer, 6 to 8 ft., E. Europe.

Kleinia—*Compositae*. Greenhouse perennials with fleshy cylindrical bluish-grey leaves. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould, broken crocks, and silver sand. Pot in spring. Position, sunny part of greenhouse or near windows in rooms. *K. repens* is used for carpet bedding in summer. Temp., Oct. to March 45° to 50°, March to Oct. 55° to 60°. Water sparingly Oct. to March, freely in summer. For outdoor culture, plant out late in May and lift again in Oct.

PROPAGATION: By cuttings of shoots dried for a few hours before insertion and then inserted in gritty compost any time during summer.

SPECIES CULTIVATED: *K. articulata*, 'Candle Plant', yellow, 18 in., summer, S. Africa; *ficoides*, white, summer, creeping, S. Africa; *fulgens*, orange and red, May, 2 ft., S. Africa; *Galpinii*, orange, autumn, 1 ft., S. Africa; *neriifolia*, yellow, winter, 4 ft., Canaries; *repens*, white, June, creeping, S. Africa.

Klugia—*Gesneriaceae*. Stove evergreen flowering plant. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts sandy loam and peat. Position, well-drained pots in shaded part of warm greenhouse or stove. Water freely March to Oct., moderately at other times.

PROPAGATION: By cuttings of young shoots inserted in sandy peat under bell-glass in spring.

SPECIES CULTIVATED: *K. zeylanica* (syn. *K. Notoniana*), blue, summer, 1 ft., Ceylon.

Knautia—*Dipsaceae*. Hardy perennial herbs, sometimes included in *Scabiosa*.

CULTURE: Soil, ordinary. Position, sunny. Plant, Oct. to Nov., or Mar. to April.

PROPAGATION: By seed; division.

SPECIES CULTIVATED: *K. arvensis* (syn. *Scabiosa arvensis*), 'Field Scabious', pale lilac-purple, summer, 1 to 3 ft., Europe, including Britain; *macedonica* (syn. *Scabiosa lyrophylla*), dark red, summer, 2 ft., Balkans.

Kniphofia (Torch Lily; Club Lily)—*Liliaceae*. Hardy herbaceous perennials. Formerly known under the generic name of *Tritoma*.

CULTURE: Soil, sandy, well enriched with manure. Position, sunny well-drained borders. Plant, April or May. Top-dress annually in April with well-decayed manure. Water freely in dry weather during spring and summer. Apply liquid manure once a week to established plants in summer. Protect in severe weather by covering of dry leaves or straw. Dwarf species suitable for the rock garden.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in shallow boxes in cold frame in March or April; transplanting seedlings outdoors when large enough to handle; division of roots in April.

SPECIES CULTIVATED: *K. Burchellii*, scarlet, yellow and green, autumn, 3 ft., S. Africa; *caulescens*, reddish-salmon, July, 4 to 5 ft., S. Africa; *comosa*, apricot-yellow, Sept., 2 ft., Abyssinia; *corallina*, scarlet, autumn, 3 ft., hybrid; *Galpinii*, red, summer, 2½ ft., Abyssinia; *gracilis*, orange-red, 2½ ft., S. Africa; *Leitchlinii*, red and yellow, Aug., 4 ft., Abyssinia; *Macowanii*, orange-red, Aug., 2 ft., S. Africa; *Nelsonii*, orange-scarlet and yellow, Aug., 18 to 24 in., Orange River Colony; *Northiae*, yellow and red, July, 4 to 5 ft., S. Africa; *pauciflora*, canary yellow, Aug., 1½ to 3 ft., Natal; *pumila*, orange-red, Aug., 18 in., S. Africa; *Rooperi*, orange-red, summer, 2 ft., S. Africa; *rufa*, red and yellow, Aug., 2 ft., Orange River Colony; *Snowdonii*, 4 to 5 ft., coral scarlet, sheltered border, Uganda; *Tuckii*, yellow and red, June, 4 ft., Cape Colony; *Tysonii*, rosy scarlet and yellow, Aug., 3 to 4 ft., S. Africa; *Uvaria* (syn. *K. alooides*), 'Red-hot Poker Plant', red and yellow, autumn, 4 ft., S. Africa, and vars. *erecta*, coral scarlet, lower flowers pointing upwards, and *maxima*, 6 to 7 ft.

Knotweed, see *Polygonum*.

Kochia—*Chenopodiaceae*. Hardy annual. Flowers, uninteresting. Leaves, narrow and green, changing to a brilliant crimson-purple tint in early autumn.

CULTURE: Soil, ordinary. Position, sunny borders. Sow seeds in light soil in a temp. of 55° in March; transplant seedlings into pots or boxes, harden off in a cold frame, and plant out 2 ft. apart each way in June.

SPECIES CULTIVATED: *K. scoparia trichophila*, 'Summer Cypress', 2 to 3 ft., Europe.

Koelreuteria—*Sapindaceae*. Hardy deciduous flowering tree. A graceful subject for lawn or shrubbery. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, open but sheltered. Plant, Oct. to March. Pruning unnecessary.

PROPAGATION: By cuttings of young shoots inserted in sandy soil under hand-light or in cold frame in April or May; sowing of imported seeds in spring.

SPECIES CULTIVATED: *K. paniculata*, 1 ft. panicles of yellow flowers, July, followed by bladder-like fruits, good autumn-tinted foliage, 30 to 60 ft., China.

Kohleria—*Gesneriaceae*. Greenhouse herbaceous perennial with scaly, catkin-like, underground stolons or tubercles.

CULTURE: Compost, two parts fibrous loam and peat, one part leaf-mould and sand. Start tubercles into growth in Feb., placing them 2 in. apart, 2 in. deep, in pots, pans or boxes. Repot into 5 in. pots when 2 in. high, subsequently repotting into 6 in. or 7 in. pots as required. Water moderately at first, freely after growth is active. After flowering, gradually withhold water from roots and when foliage dies down place pots on a shelf and allow them to rest until Feb.

PROPAGATION: By seeds sown in sandy soil, temp. 70°, March; cuttings of young shoots in April; division of the tubercles in Feb.

SPECIES CULTIVATED: *K. spicata* (syn. *Campana Oerstedii*), scarlet, summer, 3½ ft., Costa Rica.

Kohlrabi, see *Brassica caulorapa*.

Kolkwitzia—*Caprifoliaceae*. Deciduous hardy shrub with flowers resembling those of *Abelia*. First introduced early twentieth century.

CULTURE: Soil, ordinary, well drained. Position, full sun.

PROPAGATION: By Aug. cuttings in sandy soil in cold frame.

SPECIES CULTIVATED: *K. amabilis*, 'Beauty Bush', upright to 5 ft., pink with yellow throat, May and June, Cent. China.

Kowhoi, see *Sophora tetralera*.

Kumquat, see *Fortunella*.

Labichea—*Leguminosae*. Greenhouse evergreen flowering shrub. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Position, well-drained pots in light, sunny greenhouse. Pot, March. Prune into shape, Feb. Water moderately Oct. to April, freely afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°. Requires plenty of air April to Oct.

PROPAGATION: By cuttings of firm shoots inserted in sand under bell-glass in cool greenhouse, June to Aug.

SPECIES CULTIVATED: *L. lanceolata*, yellow, spring, 4 to 6 ft., Australia.

Labrador Tea, see *Ledum groenlandicum*.

+ **Laburnocytisus**—*Leguminosae*. Hardy deciduous flowering tree. A bigeneric graft-hybrid between the genera *Laburnum* and *Cytisus*, interesting but of little ornamental value.

CULTURE: As *Laburnum*.

PROPAGATION: As *Laburnum*.

SPECIES CULTIVATED: *L. Adamii*, yellow or purple, spring, 15 to 20 ft.

Laburnum—*Leguminosae*. Hardy deciduous flowering trees. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, sunny shrubberies or may be trained over pergolas, arches, etc. Plant, Oct. to March. It is advisable to remove seed pods after flowering to ensure regular flowering and to maintain healthy vigour. The seeds are poisonous.

PROPAGATION: By seeds outdoors in March or April; layers, Oct. or Nov.; varieties by grafting in March or budding in July on seedlings of common species grown in pots. These stocks are also extensively used for grafting flowering brooms.

SPECIES CULTIVATED: *L. alpinum*, 'Scottish Laburnum', yellow, June, 15 to 20 ft., Europe, and var. *fragrans*, more strongly scented, June; *anagyroides* (syn. *L. vulgare*), 'Golden Chain', yellow, spring, 20 to 30 ft., Europe, and vars. *aureum*, golden-leaved, *quercifolium*, oak-leaved, *Carlieri*, long racemes, and *pendulum*, weeping; *Watereri* (syn. *L. Vossii*), longest racemes, semi-weeping, hybrid.

Lace-bark, see *Hoheria Lyallii*; -**Fern**, see *Cheilanthes gracillima*.

Lachenalia (Cape Cowslip)—*Liliaceae*. Greenhouse bulbous flowering plants. First introduced mid-eighteenth century.

CULTURE: Compost, two parts fibrous sandy loam, half part leaf-mould, half part decayed cow manure, and one part river or coarse silver sand. Position, well-drained pots, pans or baskets; light. Pot, Aug., placing six bulbs ½ in. deep in a 5 in. pot or 1 to 2 in. apart in pans or baskets. After potting water and place pots in cold frame until Nov., then remove to airy shelf in greenhouse. Temp., 45° to 55°. Water moderately when growth begins, freely when well advanced. Apply weak stimulants occasionally when flower spikes form, discontinue when in bloom. After flowering gradually withhold water, place pots in sunny position

outdoors, and keep quite dry to ripen bulbs. Growing period, Sept. to June; resting period, June to Sept. Forcing (*L. tricolor*): Pot and treat as above until Nov., then remove into temp. of 55° to 65°.

PROPAGATION: By offsets, removed and placed in separate pots at potting time.

SPECIES CULTIVATED: *L. glaucina*, white tinged with orange, May, 6 in., S. Africa; *orchioides*, pale yellow tinged red, April to May, 9 in., S. Africa; *pendula*, yellow, red, and purple, April to May, 8 to 12 in., S. Africa; *tricolor* (syn. *L. aurea*), 'Leopard Lily', red and yellow, spring, 1 ft., S. Africa, and vars. *aurea*, bright orange-yellow, *buteola*, brown-yellow, *Nelsonii*, yellow, and *quadricolor*, yellow, green, and reddish-purple. Many named hybrids are to be found in trade lists.

Lactuca—*Compositae*. Hardy border annuals and perennials and salad vegetables. Edible lettuce introduced mid-sixteenth century.

CULTURE OF EDIBLE LETTUCE: Soil, light, rich, deeply dug, well manured. Position, south borders for spring and winter crops; open, sunny for summer crops. Make selection of garden vars. to suit season of sowing. Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 65° in Jan., Feb. or March for planting outdoors in March, April and May; in bed of rich soil in sunny spot outdoors in March, April, May and June, for planting out in April, May, June and July; outdoors in Aug. and Sept., for planting out in Sept. and Oct.; in cold frames in Oct., for planting out in March. Plant 10 in. apart in rows 12 in. asunder. Blanch cos vars. by tying bast round outside a week before required for use. Water freely when first planted, if weather dry. Cabbage vars. best for poor dry soil, cos for heavy and rich soil. Crop reaches maturity in 10 or 12 weeks. There are some vars. suitable for forcing in greenhouses, and ordinary crops will mature more quickly given frame or cloche protection.

CULTURE OF FLOWERING LETTUCE: Soil, sandy loam. Position, open, sunny, dryish border. Plant, Oct. or March.

PROPAGATION: Flowering lettuce by seeds sown $\frac{1}{8}$ in. deep outdoors in April; division of roots in March. Edible species by seed.

SPECIES CULTIVATED: *L. alpina* (syn. *Mulgedium alpinum*), blue, Aug., 3 ft., N. Europe; *Plumieri* (syn. *Mulgedium Plumieri*), purple, summer, 8 ft., Pyrenees; *saliva*, 'Lettuce', yellow, summer, 3 to 4 ft., and vars. *asparagina*, 'Asparagus Lettuce', *capitata*, 'Cabbage Lettuce', *crispa*, 'Curled Lettuce', *longifolia*, 'Cos Lettuce'.

Lad's Love, see *Artemisia Abrotanum*.

Lady Bell, see *Adenophora*; -**Fern**, see *Athyrium Filix-femina*.

Lady's Mantle, see *Alchemilla*; -**Slipper**, see *Cypripedium*.

Lady-smock, see *Cardamine pratense*.

Laelia—*Orchidaceae*. An epiphytic genus closely allied to *Cattleya*, with which genus very many hybrids have been produced, also with *Brassavola*, *Epidendrum*, etc.

CULTURE: Compost, as for *Cattleyas* for all. Broadly there are two sections, one much like the *Cattleya labiata* group requiring the same conditions. The second with smaller, often ovoid, pseudo-bulbs and rather tall, slender scapes terminating in several flowers, usually smaller than those of the first section. This section succeeds in the cool house, but can be grown with the others suspended near the glass in pans, during the summer and given a rather severe rest in the cool house in winter, temp. 50°. In each section the spikes are terminal to the pseudo-bulb.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection: clavate-bulbed species—*L. crispa* (syn. *Cattleya crispa*), white, purple flushed, lip purple, variable, summer, Brazil; *grandis*, yellow shaded buff, lip dusky rose-purple with deeper veins, summer, Brazil; *lobata* (syn. *L. Boothiana*), rose-purple, lip amethyst-purple, summer, Brazil; *Perrinii*, rose or rose-lilac, lip intense purple, crimson on mid lobe

autumn, winter, Brazil, and var. *alba*, white; *purpurata*, variable, white, rose-flushed, lip rich crimson-purple, spring, summer, Brazil, very many vars.; *tenebrosa* (syn. *L. grandis tenebrosa*), bronze and copper shaded, lip dusky brown-purple, summer, Brazil; *xanthina*, yellow, lip whitish suffused purple, variable, spring, summer, Brazil.

Species requiring more decided rest, enjoying sun heat and a moist atmosphere in the summer—*L. albida*, very variable, white, rose-flushed, winter, Mexico, and several named vars.; *anceps*, very variable, pale to deep rose, lip crimson, purple-crimson, yellow keels, winter, Mexico, and many named vars.; *autumnalis*, rose-purple, whitish, variable, autumn, winter, Mexico, and var. *atrorubens*, a type with much darker flowers; *Gouldiana*, deep rose-purple, winter, Mexico; *rubescens*, lilac-rose, winter, Mexico; *speciosa* (syn. *L. majalis*), lilac, lip whitish, purple, blotched purple-lilac, spring, summer, Brazil.

Species suited to the Odontoglossum house, not rested.—*L. harpophylla*, orange-red, slender habit, winter, spring, Brazil; *Jongheana*, large, lilac-purple, lip rose-purple, yellow, winter, spring, Brazil, should be similarly treated; *pumila*, dwarf-growing, variable, rose-purple to deep purple, and many vars. occur under the name *Dayana*, a varietal type, slightly smaller, mauve, deep purple, also has many named vars, as has var. *major* (syn. var. *praestans*), a third type, mauve to red-purple, autumn, Brazil.

× **Laleiocattleya**—*Orchidaceae*. Bigeneric hybrids between the genera *Cattleya* and *Laelia*. Some 2,000 distinct hybrids have been recorded and further additions are being made. Nature had antedated the artificial hybrids and several *Laeliocattleyas* have been imported, including the variable *L. elegans* (syns. *Laelia elegans* and *Laeliocattleya Schilleriana*).

CULTURE: Compost, conditons, temperatures, as for *Cattleyas*.

Lagarosiphon (Giant Water Thyme)—*Hydrocharitaceae*. Submerged aquatics which are excellent oxygenators. First introduced early twentieth century.

CULTURE: Any soil. Position, outdoor pools, tropical and cold water aquariums. Plant, any time during growing season.

PROPAGATION: Slips pulled off and rooted in mud.

SPECIES CULTIVATED: *L. major* (syn. *Elodea crista*), reflexed leaves in whorls up branching stems, S. Africa.

Lagenaria (Bottle Gourd; Trumpet Gourd)—*Cucurbitaceae*. Hardy orn. fruiting annual. Fruit not edible, oblong, bottle-like, 1 to 6 ft. long. First introduced late sixteenth century.

CULTURE: Soil, rich, ordinary. Position, beds at foot of low sunny walls, fences or arbours, or on the summits of sunny banks, shoots growing at will. Plant, June. Water freely and apply stimulants when fruit has formed. No pinching of shoots required. May also be grown in pots in sunny greenhouses, training shoots up roof.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in temp. 55° to 65° in April.

SPECIES CULTIVATED: *L. siceraria* (syn. *L. vulgaris*), white, summer, 10 ft., Trop. Asia and Africa.

Lagerstroemia—*Lythraceae*. Stove and greenhouse evergreen flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam and peat, little sand. Position, well-drained pots in light part of greenhouse or stove. Pot, Feb. or March. Prune, slightly in Oct. or Nov. Water freely March to Oct., very little Oct. to March. Syringe twice daily March to Sept. Temp., stove species, 55° to 60° Oct. to March, 65° to 75° March to Oct.; greenhouse species, Oct. to March 45° to 55°, March to Oct. 60° to 70°.

PROPAGATION: By cuttings of firm shoots inserted in sandy peat under bell-glass in temp. of 70° to 80° in March, April, Aug. or Sept.

STOVE SPECIES CULTIVATED: *L. speciosa* (syn. *L. Flos-Reginae*), rose purple, summer. 50 to 60 ft., Trop. Asia.

GREENHOUSE SPECIES CULTIVATED: *L. indica*, 'Crape Myrtle', pink, summer, 6 to 10 ft., Trop. Asia; *indica alba*, white.

Lagunaria—*Malvaceae*. Greenhouse evergreen flowering tree. First introduced late eighteenth century.

CULTURE: Compost, fibrous loam, peat and sand. Position, well-drained pots in light greenhouse, also planted out in a border of well-drained soil. Water freely March to Oct., moderately Nov. to Feb.

PROPAGATION: By cuttings of half-ripened shoots in sandy peat under bell-glass or in propagating frame, in gentle heat during May.

SPECIES CULTIVATED: *L. Patersonii*, reddish-white, summer, 20 ft., Australia.

Lagurus—*Gramineae*. Hardy ornamental annual grass. Inflorescence borne in egg-shaped heads, white, downy, June to Sept. Very useful in dried state for winter decorations.

CULTURE: Soil, ordinary. Position, open dryish borders. Gather inflorescence for drying in Aug.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep outdoors in April where plants are required to grow.

SPECIES CULTIVATED: *L. ovatus*, 'Hare's Tail Grass', 1 ft., S. Europe (Br.).

Lallemantia—*Labiatae*. Small annual or biennial herbs with opposite toothed leaves and small two-lipped flowers in whorls.

CULTURE: Soil, ordinary well drained. Position, sunny.

PROPAGATION: By seed.

SPECIES CULTIVATED: *L. canescens*, blue, summer, to $1\frac{1}{2}$ ft., biennial, W. Asia.

Lamarckia—*Gramineae*. Hardy ornamental annual grass. Inflorescence plume-like, silky and golden, June to Sept. Useful in a dried state for winter decorations. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, patches in open sunny borders. Gather inflorescence for winter use in Aug.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep outdoors in April where plants are required to grow, or in well-drained pans of light soil in cold frame in Oct., planting outdoors in April.

SPECIES CULTIVATED: *L. aurea*, 8 in., S. Europe.

Lamb's Ear, see *Stachys lanata*; -**Lettuce**, see *Valerianella olitoria*.

Lamium (Dead-Nettle)—*Labiatae*. Hardy perennial flowering herb. Leaves, egg- or heart-shaped, with serrated margins.

CULTURE: Soil, ordinary. Position, dryish, sunny borders. Plant, Oct. or April.

PROPAGATION: By division of roots, Oct. or March.

SPECIES CULTIVATED: *L. maculatum aureum*, leaves variegated with golden yellow, 1 ft., Europe (Br.).

Lampranthus—*Aizoaceae*. Greenhouse succulent plants, formerly included in *Mesembryanthemum*.

CULTURE: Compost, equal parts old mortar, pounded crocks, sandy loam, well-decayed manure or leaf-mould, and sand. Position, well-drained pots in sunny greenhouse or window, may be planted in sunny borders outdoors from June to Sept. Pot, March to May. Water freely April to Sept., keep nearly dry during winter. Temp., March to Oct. 55° to 65° , Oct. to March 40° to 50° .

PROPAGATION: By seed; cuttings in temp. 55° to 65° , March to Sept.

SPECIES CULTIVATED: *L. aurantiacus* (syn. *Mesembryanthemum aurantiacum*), bright orange, summer, 1 to 2 ft., S. Africa; *aureus* (syn. *M. aureum*), yellow, June, 1 ft., S. Africa; *blandus* (syn. *M. blandum*), white, June, 18 in., S. Africa; *Brownii* (syn. *M. Brownii*), orange-red, summer, 1 ft., S. Africa; *coccineus* (syn. *M. coccineum*), scarlet, July, 18 in., S. Africa; *emarginatus* (syn. *M. violaceum*), purple, July, 1 ft., S. Africa; *roseus* (syn. *M. roseum*), pale rose, July, $1\frac{1}{2}$ to 2 ft., S. Africa; *spectabilis* (syn. *M. spectabile*), red, May, 1 ft., S. Africa.

Land Cress, see *Barbarea verna*.

Lantana—*Verbenaceae*. Greenhouse and half-hardy evergreen flowering shrubs. First introduced late seventeenth century.

POT CULTURE: Compost, two parts loam, one part peat, leaf-mould or decayed manure, little sand, and charcoal. Position, well-drained pots in light greenhouse. Pot, firmly, March. Water freely April to Oct., moderately Oct. to April. Prune into shape, Feb. Temp., Oct. to March 45° to 55°, March to Oct. 55° to 65°. Apply weak stimulants once or twice weekly, May to Sept.

OUTDOOR CULTURE: Soil, rich sandy. Position, sunny, dryish beds or borders. Plant, June. Lift in Sept., repot and replace in greenhouse for winter.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in well-drained pots or pans of sandy peat and leaf-mould, in temp. of 70° to 80°, in Feb., March or April; by cuttings of firm shoots, 2 to 3 in. long, inserted in small pots of sandy peat under bell-glass in temp. of 55° to 65° in Aug. or Sept.; or by cuttings of young side shoots 2 in. long inserted as above in temp. 60° to 70°, March or April.

SPECIES CULTIVATED: *L. Camara*, violet, summer, 4 ft., Trop. America; *Chelsonii*, orange-red, summer, 2 ft., S. America; *montevidensis* (syn. *L. Sellowiana*), rosy lilac, summer, 3 ft., S. America; *nivea*, white, summer, 2 to 3 ft., Trop. America. Numerous vars. superior to species in trade lists.

Lapageria—*Liliaceae*. Greenhouse and half-hardy evergreen flowering climber. First introduced early nineteenth century.

INDOOR CULTURE: Compost, three parts fibrous peat, one part loam, one part equal proportions of sand and charcoal. Position, shady in large, well-drained pots, tubs, beds, or borders, with shoots trained to trellises or up walls or rafters of greenhouse. Pot or plant, Feb. or March. Good drainage very essential. Water freely April to Sept., moderately afterwards. Syringe daily from March until flowers develop. Prune away dead or sickly shoots only in March. Ventilate freely April to Oct. Temp., Oct. to March 40° to 50°, March to Oct. 55° to 65°. Foliage must be kept free from insects.

OUTDOOR CULTURE: Soil, equal parts peat and loam. Position, west walls, sheltered, in S. of England only. Plant, Oct. or March, in well-drained bed. Protect in severe weather. Water freely in dry weather.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots or pans of sandy peat and leaf-mould in temp. of 55° to 65° in March or April; by layering strong shoots in sandy peat in spring or autumn.

SPECIES CULTIVATED: *L. rosea*, 'Chilean Bellflower', rose, summer, 15 to 20 ft., Chile, and vars. *albiflora*, white, and *superba*, crimson.

Lapeirousia—*Iridaceae*. Hardy and half-hardy bulbous flowering plants. First introduced late eighteenth century.

OUTDOOR CULTURE: Soil, sandy loam and leaf-mould. Position, sunny well-drained borders or rockeries. Plant bulbs 4 in. deep and 3 in. apart, Sept. to Oct.

POT CULTURE: Compost, equal parts sandy loam, leaf-mould and sand. Position, cold frame Sept. to Feb., cool or cold greenhouse afterwards. Pot, Sept., placing six bulbs in a 6 in. pot, and cover with cinder ashes till growth begins. Water moderately when new growth commences; keep dry after flowering till potting time.

PROPAGATION: By offshoots removed at planting or potting time and treated as old bulbs.

SPECIES CULTIVATED: *L. cruenta* (syn. *Anomatheca cruenta*), crimson, summer, 1 ft., hardy, Cape of Good Hope; *grandiflora*, red and yellow, summer, 1 ft., tender, best grown in pots., Cape of Good Hope.

Laportea—*Urticaceae*. Stove perennial herb, with ornamental fruits. Plants possess stinging hairs and require to be handled with great care.

CULTURE: Compost, rich loam and fibrous peat or leaf-mould with sharp sand. Position, well-drained pots in warm greenhouse. Water carefully at all times.

PROPAGATION: By seeds sown in sandy soil in temp. 65° to 70° in spring. Cuttings placed in sand under bell-glass in heat.

SPECIES CULTIVATED: *L. crenulata*, India.

Larch, see *Larix*.

Lardizabala—*Lardizabalaceae*. Slightly tender evergreen flowering climber. First introduced mid-nineteenth century.

CULTURE: Soil, equal parts sandy loam and peat. Position, well-drained border at base of south or west walls in mild districts. Plant, Sept., Oct., March or April. Prune away dead or straggling shoots only in April. Suitable also for growing against walls in cold greenhouses or conservatories.

PROPAGATION: By cuttings of firm shoots, 1 to 2 in. long, inserted in sandy loam and peat in well-drained pots under bell-glass in temp. 45° to 55°, July or Aug.

SPECIES CULTIVATED: *L. biternata*, vigorous to 30 or 40 ft., large leathery leaves, flowers unisexual, dark purple, fruits 3 in. long, edible.

Larix (Larch)—*Pinaceae*. Hardy deciduous trees. Grown largely for timber purposes. First introduced early seventeenth century.

CULTURE: Soil, any except heavy clay. Position, hill slopes or banks, sheltered from north; low, damp situations not suitable. Plant in autumn. Distance for planting, 3 to 4 ft. each way. Also make fine specimen trees planted singly on lawns or in open places. Best age to plant, two years old. Land best trenched a good spit deep before planting. Number of trees required to plant an imperial acre at 3 ft., 4,840; at 4 ft., 2,722. Thinning should commence at five years old. Each imperial acre should contain about 1,200 trees at tenth year; 900 at fifteenth year; 600 at twentieth year; 450 at twenty-fifth year; and 300 in thirtieth year; latter number to be permanent crop. Trees attain maturity when 30 to 70 years old. Bear seeds when 30 to 40 years old. Number of seeds in a pound, 5,000. Weight of a bushel of seed, 14 lb. Weight of timber per cubic foot, 38 lb. Timber used for fencing, pit wood, scaffold poles, and boat building. Quantity of seeds to sow 100 ft. square of bed, 8 oz.

PROPAGATION: By seeds sown 1 in. deep in March. Transplant seedlings when two years old.

SPECIES CULTIVATED: *L. decidua* (syn. *L. europaea*), 'European Larch', 60 to 120 ft., Europe, and var. *pendula*; *Griffithii*, 40 to 60 ft., Himalaya; *laricina* (syn. *L. americana*), to 60 ft., America; *leptolepis*, 'Japanese Larch', 80 to 100 ft., Japan; *Gmelinii* (syn. *L. dahurica*), 50 to 80 ft., Siberia; *occidentalis*, 100 to 200 ft., N. America; *sibirica*, 'Siberian Larch', to 100 ft., Siberia.

Larkspur, see *Delphinium*.

Lasiandra, see *Tibouchina*.

Lasthenia—*Compositae*. Hardy annuals. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, warm, sheltered rockeries, beds or borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in April where plants are required to grow for summer flowering; in Sept. to Oct. similarly for spring flowering.

SPECIES CULTIVATED: *L. glabrata*, yellow, summer, 1 ft., California.

Lastrea, see *Dryopteris*.

Latania—*Palmae*. Stove palms with fan-shaped, bright green leaves.

CULTURE: Compost, two parts loam, one part peat and a little charcoal and sand. Position, well-drained pots in shady part of stove. Pot, Feb. or March. Water freely March to Sept., moderately afterwards. Syringe once daily in winter, twice other times. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in rich light soil in temp. of 80° to 90°, Feb., March or April.

SPECIES CULTIVATED: *L. Commersonii*, 7 ft., Mauritius and Bourbon; *Ver-*

schaffeltii (syn. *L. aurea*), 7 ft., Mauritius. See also *Livistona chinensis*, which is frequently erroneously named *Latania borbonica*.

Lathraea—*Orobanchaceae*. Herbaceous, perennial, leafless, parasitic plants.

CULTURE: Plant seeds on the roots of Willow, Poplar or Hazel.

SPECIES CULTIVATED: *L. clandestina*, purple, 3 in., spring, Europe; *Squamaria*, purplish, Britain.

Lathyrus—*Leguminosae*. Hardy annuals and herbaceous perennial climbers. Sweet Pea introduced early eighteenth century.

CULTURE OF SWEET PEA: Soil, rich ordinary, well manured. Position, groups in sunny borders, shoots supported by tree branches or bamboo canes; against sunny walls or fences; in sunny window boxes; in rows in open garden. Sow seeds, three or four, in a 3 in. pot in light soil in temp. 50 to 55° in Feb., transplanting seedlings outdoors in April; or 2 in. deep and 3 to 6 in. apart in Oct. or March where plants are to grow. Water liberally in dry weather. Apply liquid manure once or twice weekly to plants in flower. Remove seed pods as they form to ensure plenty of flowers.

POT CULTURE: Sow four seeds 1 in. deep in 3 in. pots in temp. 55° in Jan. or Feb. Compost, two parts loam, one part leaf-mould and sand. Transfer four seedlings, when 2 in. high, to a 5 in. pot. Support shoots with small twigs or bamboo canes. Water liberally. Apply liquid manure when buds show. Grow in cool greenhouse, conservatory or window when in flower.

EXHIBITION OR SPECIAL CULTURE: Grow in rows 8 ft. apart. Dig trenches 18 in. wide and 2 ft. deep. Fork into subsoil 2 in. of rotting manure, then fill up trench to within 2 in. of top with ordinary soil and good loam. Add a handful each of superphosphate and kainit to each linear yard of trench and fork in. Sow seeds 1 in. deep and 3 in. apart in Oct., or five seeds in a 3 in. pot of good soil in cold frames in Oct., and plant out seedlings 6 in. apart in April. Stake early, using bamboo canes at least seven feet high. Feed with half-ounce of sulphate of ammonia to gallon of water. Give 3 gallons to each group or linear yard of row once a week. Remove all side growths, keeping each plant to a single stem. Nip off points of shoots when top of sticks is reached, or, alternatively, untie each plant, loop the old growth round the bottom of its stake, and allow the growing point to climb to the top once more. Remove spent blooms daily.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary deep rich. Position, against sunny walls, fences, arbours, or tree stumps or banks. Plant, Oct., Nov., March or April. Apply liquid manure occasionally in summer. Water freely in dry weather. Prune away stems close to ground in Oct. Top-dress with decayed manure in March.

PROPAGATION: Annuals by seed; perennials by seed or division of roots in March or April.

ANNUAL SPECIES CULTIVATED: *L. odoratus*, 'Sweet Pea', various, 6 to 10 ft., Italy; *sativus azureus*, blue, summer, 2 ft., S. Europe; *tingitanus*, 'Tangier Pea', purple and red, summer, 4 to 6 ft., Tangier.

PERENNIAL SPECIES CULTIVATED: *L. grandiflorus*, rosy crimson, summer, 5 ft., S. Europe; *latifolius*, 'Everlasting Pea', red, crimson, and violet, 8 to 10 ft., Europe; *latifolius albus*, white; *magellanicus*, 'Lord Anson's Pea', purple, June to Sept., 6 to 8 ft., Straits of Magellan; *pubescens*, pale blue, July to Sept., 3 to 5 ft., Chile; *rotundifolius*, rosy pink, summer, 6 ft., Asia Minor; *splendens*, carmine red, summer, California, rather tender; *undulatus*, rosy purple, May and June, 2 to 3 ft., Dardanelles; *vernus* (syn. *Orobis vernus*), purple and blue, spring, 1 ft., Europe.

Laurel, see *Laurus*; **Alexandrian**-, see *Danae racemosa*; **Californian**-, see *Umbellularia californica*; **Cherry**-, see *Prunus cerasifera*; **Mountain**-, see *Kalmia latifolia*; **Portugal**-, see *Prunus lusitanica*; **Sheep**-, see *Kalmia angustifolia*; **Spurge**-, see *Daphne Laureola*.

Laurus (Bay Tree)—*Lauraceae*. Hardy evergreen shrub or small tree. Insigni-

ficant yellow flowers, male and female borne on separate plants; berries, dark purple. The dark green aromatic leaves are used for flavouring. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, open sunny lawns, sheltered shrubberies or borders. Plant, Sept., March or April. Good subject for clipping to formal shape, may be purchased as pyramids or standards. Trim between May and July.

CULTURE IN TUBS: Compost, two parts loam, one part leaf-mould and sand. Plant, Sept., Oct., March or April. Water sparingly Oct. to April, freely afterwards. May stand in sunny sheltered position for the winter or in a cold greenhouse. Although perfectly hardy, severe weather may cause a browning of the leaves.

PROPAGATION: By cuttings of shoots 3 to 4 in. long in sandy soil under hand-light in shady place outdoors, Aug. to Oct.; layering shoots Sept. or Oct.

SPECIES CULTIVATED: *L. nobilis*, 'Sweet Bay', 'Victor's Laurel', 'Poet's Laurel', 20 to 40 ft., S. Europe.

Lavandula (Lavender)—*Labiatae*. Hardy evergreen fragrant flowering shrubs. The flowers are highly esteemed for their fragrance in a dried state and for distilling for perfumery, being grown commercially for the latter purpose. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary light. Position, warm, dry and sunny. Plant, March or Sept. Prune straggly plants into shape in March or April; this should be done regularly to lavender hedges to prevent them from getting bare at the base. Gather blossoms for drying just as they come into bloom and for distilling about a week later.

PROPAGATION: By cuttings in ordinary soil in shaded frame in August or out of doors in sheltered border Sept to Oct.

SPECIES CULTIVATED: *L. officinalis* (syn. *L. Spica*), lavender, grey foliage, July to Aug., 3 to 4 ft., Medit. Region, and vars. *alba*, white, *compacta*, low and compact.

Lavatera (Tree Mallow)—*Malvaceae*. Hardy flowering sub-shrubs and annuals.

CULTURE OF SHRUBBY SPECIES: Soil, ordinary. Position, warm, dryish borders. Plant, June. *L. arborea*, the Tree Mallow, is not fully hardy inland, but quickly naturalises itself in maritime districts.

CULTURE OF ANNUAL SPECIES: Soil, ordinary light rich. Position, sunny beds or borders. Sow seed $\frac{1}{2}$ in. deep where plants are required to grow, in Sept. or April.

PROPAGATION: Shrubby species by seeds sown in pots or boxes of light soil in temp. of 55° to 60° in Feb. or March; or in sunny position outdoors, April or May; variegated species by cuttings of young shoots inserted in sandy soil under bell-glass in gentle bottom heat during June or July.

SHRUBBY SPECIES: *L. assurgentiflora*, purple, summer, 6 to 10 ft., S. California; *arborea* 'Tree Mallow', purple, autumn, 8 to 10 ft., Europe (Britain), and its variety *variegata*, leaves mottled with white; *Olbia*, rosy pink, summer and autumn, 6 ft., S. Europe.

ANNUAL SPECIES: *L. trimestris* (syn. *L. rosea*), rose, 4 to 6 ft., S. Europe, var. *alba*, white.

Laurustinus, see *Viburnum Tinus*.

Lavender, see *Lavandula*; -**Cotton**, see *Santolina Chamaecyparissus*.

Lawson's Cypress, see *Chamaecyparis Lawsoniana*.

Layia—*Compositae*. Hardy annuals. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny beds or borders.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light mould in temp. 45° to 55° in April, transplanting seedlings outdoors end of May; or outdoors in April where plants are required to grow.

SPECIES CULTIVATED: *L. calliglossa*, yellow, summer, 1 ft., California; *chrysanthemoides* (syn. *Oxyura chrysanthemoides*), yellow and white, summer, 1 ft., California; *elegans*, 'Tidy Tips', yellow and white, summer, 1 ft., California;

glandulosa, white, summer, 6 to 18 in., N. America; *platyglossa* (syn. *Callichroa platyglossa*), yellow, summer, 1 ft., California.

Lead Plant, see *Amorpha canescens*; **-wort**, see *Plumbago*.

Leaf-flowering Cactus, see *Schlumbergera* and *Zygocactus*.

Leatherwood, see *Cyrilla racemiflora*.

Lebanon Candytuft, see *Aethionema coridifolium*.

Ledum—*Ericaceae*. Hardy evergreen flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary, but rich in humus and free from lime. Position, open, but not too dry, beds or borders in company with azaleas, kalmias, etc. Plant, Oct., Nov. or March, disturbing roots as little as possible.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in a well-drained pan of sandy peat in a cold frame in March; by layering in Sept.; division of roots in Sept. or Oct.

SPECIES CULTIVATED: *L. groenlandicum* (syn. *L. latifolium*), 'Labrador Tea', white, April, 3 ft., N. America, the prettiest species with scented leaves, woolly beneath; *palustre*, 'Marsh Rosemary', white, May, 2 ft., N. Europe. See also *Leiophyllum*.

Leea—*Vitaceae*. Stove shrub with pinnate leaves. Leaves, feather-shaped, bronze green, striped with white above and dark red below. First introduced late nineteenth century.

CULTURE: Compost, two parts loam, one part well-decayed manure or leaf-mould and one part sharp silver sand. Position, well-drained pots in shade. Pot, Feb. or March. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°. Water freely March to Sept., moderately afterwards. Syringe daily April to Aug.

PROPAGATION: By cuttings of side shoots inserted in sandy soil under bell-glass in temp. 75° to 85° in spring.

SPECIES CULTIVATED: *L. amabilis*, 3 ft., Borneo, and var. *splendens*, superior form; *coccinea*, scarlet, summer, 1 ft., Burma.

Leek, see *Allium Porrum*.

Leiophyllum (Sand Myrtle)—*Ericaceae*. Hardy evergreen flowering shrubs. First introduced early eighteenth century.

CULTURE: Soil, light, lime-free, rich in humus. Position, rockeries, heath gardens or in front of azaleas. Plant, Oct., Nov., or March.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in well-drained pan of sandy peat in a cold frame in March; Aug. cuttings in gentle bottom heat.

SPECIES CULTIVATED: *L. buxifolium*, compact, rich pink buds opening rose, May and June, to 18 in., East N. America; *Lyonii* (syn. *L. buxifolium prostratum*), prostrate, densely branched, N. Carolina.

Lemon, see *Citrus Limonia*; **-scented Verbena**, see *Lippia citriodora*.

Lens—*Leguminosae*. Hardy annual. Leaves, feather-shaped. Pods, about $\frac{3}{4}$ in. long, $\frac{1}{2}$ in. broad, containing two seeds. Seeds, a cheap and nutritious source of food in some countries. Vines sometimes used as forage. Introduced mid-sixteenth century.

CULTURE: Soil, light ordinary. Position, sunny borders. Sow seeds 2 in. deep and 2 in. apart in drills 18 in. asunder early in April. Allow the plants to grow till quite yellow, then pull up, dry thoroughly in the sun, gather pods and store in a dry place till required for use. Thrash as required.

SPECIES CULTIVATED: *L. esculenta*, 'Lentil', white, June to Aug., 1 ft., S. Europe.

Lent Lily, see *Narcissus Pseudo-Narcissus*.

Lentil, see *Lens esculenta*.

Lenten Rose, see *Helleborus orientalis*.

Leonotis—*Labiatae*. Greenhouse and half-hardy evergreen flowering shrub. First introduced early eighteenth century.

INDOOR CULTURE: Compost, two parts rich loam, one part equal proportions of leaf-mould, charcoal and silver sand. Position, well-drained pots in light, airy part of greenhouse, Sept. to June; sunny place outdoors, June to Sept. Pot, March or April. Prune into shape after flowering. Water moderately April to Sept., very sparingly afterwards. Temp., Sept. to April 40° to 50°, April to June 55° to 65°.

OUTDOOR CULTURE: Soil, sandy loam. Position, warm, sheltered border in mild southern districts only. Plant, May. Protect in winter with bracken or straw.

PROPAGATION: By cuttings of shoots inserted in light sandy soil in temp. 55° to 65° in March or April. Young plants require tops of shoots to be removed occasionally.

SPECIES CULTIVATED: *L. Leonurus*, 'Lion's Ear', orange-scarlet, summer, 3 to 5 ft., S. Africa.

Leontice—*Berberidaceae*. Hardy tuberous-rooted perennials. First introduced late sixteenth century.

CULTURE: Soil, equal parts sandy loam, leaf-mould and sand. Position, sheltered, sunny rockery. Plant tubers in Sept. or Oct.; base only of tuber to be buried in the soil, leaving the upper part exposed. Mulch with peat or decayed leaves in summer and protect tubers with covering of ashes in winter.

PROPAGATION: By offsets, removed and planted in Sept. or Oct.

SPECIES CULTIVATED: *L. Albertii*, 'Lion's Turnip', brown and yellow, spring, 6 to 8 in., Turkistan; *Leontopetalum*, 'Lion's Leaf', yellow, spring, 1 ft., Caucasus.

Leontopodium—*Compositae*. Hardy perennial herb. First introduced mid-eighteenth century.

CULTURE: Soil, well-drained, sandy. Position, exposed sunny rockeries. Plant, March or April. Protect from heavy rains in autumn and winter by placing a square of glass, supported by sticks at each corner, a few inches above the plants. Gather flowers in Aug. and dry for preserving. Best results are obtained by raising fresh plants from seed annually, or by dividing old plants in spring.

PROPAGATION: By seeds sown in March in a well-drained pan of fine loam, leaf-mould and granite chips, placed under a hand-light, or in a cold frame in a cool shady spot, transplanting seedlings outdoors in Aug. or Sept.; by division in April.

SPECIES CULTIVATED: *L. alpinum*, 'Edelweiss', yellow, May to July, surrounded by star-shaped, white, cottony involucre, 6 in., Alps; *calocephalum*, white, May, 9 in., China; *crassense*, white, May, 4 in., Bulgaria; *haplophyllodes* (syn. *L. aloysi-odorum*), 'Lemon-scented Edelweiss', grey-white, June, 6 in., China; *japonicum*, white, May, 9 in., China, Japan; *leontopodioides*, white, spring, 6 to 9 in., Siberia; *nivale*, white, May, 3 in., Balkans; *Palibinianum*, white, May, 9 in., Asia.

Leopard's-bane, see *Doronicum*.

Lepachys—*Compositae*. Hardy perennials. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Plant, Oct., or March to April. Sometimes grown as an annual.

PROPAGATION: By seeds sown in well-drained boxes in cool greenhouse or frame during March or April.

SPECIES CULTIVATED: *L. columnifera* (syn. *L. columnaris*), yellow and brown, late summer, 2 to 2½ ft., N.W. America; *pinnata*, yellow and brown, late summer, 3 to 5 ft., N. America.

Lepidium (Cress)—*Cruciferae*. Hardy annual. Leaves, finely divided, agreeably flavoured and largely used in conjunction with mustard for salads. First introduced early sixteenth century.

OUTDOOR CULTURE: Soil, ordinary. Position, open borders. Sow seeds on

surface of soil, water, and cover with mats or boards until they germinate; or in drills $\frac{1}{2}$ in. deep and 6 in. apart. Make first sowing end of March, follow with successional sowings every 10 days until Sept., then cease. Gather for salading when 1 in. high. Two crops sufficient off one piece of ground.

INDOOR CULTURE: Sow seed on surface of light soil in shallow boxes, moisten with tepid water, cover with sheet of paper, slate, or board, and place in warm position in greenhouse or room. Sow for succession every 7 days. Two crops may be grown in same soil. Seeds may be sown on flannel kept moist in a warm room, at any time of year.

SPECIES CULTIVATED: *L. sativum*, 'Common Cress', white, 3 to 6 in., Persia.

Leptarrhena—*Saxifragaceae*. Perennial evergreen herbs.

CULTURE: Soil, cool, slightly moist, and a not-too-hot position in the rock garden or woodland.

PROPAGATION: By division of old plants in spring or autumn.

SPECIES CULTIVATED: *L. pyrolifolia* (syn. *L. amplexifolia*), white, summer, 9 in., N. America.

Leptochilus—*Polypodiaceae*. Stove evergreen ferns, sometimes included in *Acrostichum*.

CULTURE: As *Acrostichum*.

PROPAGATION: As *Acrostichum*.

SPECIES CULTIVATED: *L. auritum*, 1 to 2 ft., Philippines; *flagelliferum*, 1 ft., Tropics; *nicotianaeifolium*, 1 to 2 ft., Cuba; *virens*, 1 ft., Trop. Asia.

Leptopteris—*Osmundaceae*. Greenhouse evergreen ferns with finely or coarsely divided fronds, dark green, mostly semi-transparent, previously known as *Todea*. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould, charcoal, sandstone and silver sand. Position, moist, shady, in damp recesses of rockeries, under bell-glasses or in cases. Plant, March. Water freely March to Oct., moderately Oct. to March. Moist atmosphere and shade most essential but syringing unsatisfactory. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°. *L. superba* and *L. hymenophylloides* suitable for cold houses.

CULTURE IN CASES: Compost, as above. Position, shady window, not exposed to sun. Pot or plant, March. Top-dress with fresh compost annually in March. Water freely April to Sept., moderately afterwards. Ventilate case few minutes daily. Suitable species are *L. superba* and *L. hymenophylloides*.

PROPAGATION: By spores sown on surface of sandy peat in shallow pan covered with bell-glass in temp. 65° to 75° at any time; by division of plants at potting time.

SPECIES CULTIVATED: *L. barbata*, S. Africa, Australia and New Zealand; *hymenophylloides* (syn. *Todea hymenophylloides*), New Zealand; *superba*, 'Prince of Wales's Feather Fern', New Zealand; *Wilkesiana*, Fiji and New Hebrides.

Leptospermum—*Myrtaceae*. Slightly tender evergreen flowering shrubs. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary, but light and well drained. Position, sheltered gardens near the seaside or against a south wall in the southern counties, but not suitable for cold districts. Plant in April or May. Prune slightly in April when required.

PROPAGATION: By cuttings in sandy peat, in pots, in a cold frame in autumn.

SPECIES CULTIVATED: *L. scoparium*, 'South Sea Myrtle', white, May and June, 6 ft., or more in warmest localities, Australia and New Zealand, and vars. *Chapmanii*, pink, *grandiflora*, larger flowers, *myrtifolium*, of comparative hardiness, *Nichollsii*, crimson, and *prostratum*, white flowered and the hardiest of all.

Leptosyne—*Compositae*. Hardy annuals and perennials.

CULTURE: Soil, ordinary. Position, sunny well-drained beds or borders. Plant, perennial species in Oct. or March; annual species, May or June.

PROPAGATION: All species by seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 55° to

60° in March; transplant seedlings when 1 in. high, 2 in. apart in boxes of light soil, and keep in cool greenhouse till May or June, then plant outdoors.

SPECIES CULTIVATED: *L. calliopsidea*, yellow, Sept., 18 in., California; *Douglasii*, yellow, autumn, 1 ft., California; *maritima*, perennial, yellow, autumn, 1 ft., California; *Stillmanii*, yellow, autumn, 1 ft., California.

Leptotes—*Orchidaceae*. Dwarf-growing epiphytal orchids, allied to *Laelia*. Flowers terminating the short fleshy stem, leaves solitary, fleshy, terete.

CULTURE: Compost, temp., etc., as for *Cattleyas*. Only occasional waterings are required in winter, the temp. then 55° to 60°. Expose to light in autumn. Pans which can be suspended are preferable.

PROPAGATION: By division of plants in March.

SPECIES CULTIVATED: *L. bicolor* (syn. *Tetramicra bicolor*), white and purple, winter, 3 to 7 in., Brazil, and vars. *brevis*, white, lip lined purple basally, *serrulata* (syn. *L. serrulata*), larger, white, lip with purple-lilac lines, its side lobes serrulate.

Leschenaultia—*Goodeniaceae*. Greenhouse flowering evergreen shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous peat and one part silver sand. Pot, March or April. Position, well-drained pots in light, sunny greenhouse. Temp., Sept. to March 40° to 50°, March to Sept. 55° to 65°. Water sparingly Oct. to April, moderately afterwards; use soft water only. Manures or stimulants not required. After flowering nip off the points of the shoots. Repotting only necessary every second year. Firm potting essential. Ventilate freely in fine weather.

PROPAGATION: By cuttings of young growth inserted in sandy peat under bell-glass in temp. 50° to 55° from April to July.

SPECIES CULTIVATED: *L. biloba*, blue, summer, 1 ft., Australia, and var. *major*, large-flowered; *formosa*, scarlet, summer, 1 ft., Australia; *linarioides*, yellow, Aug., Australia.

Lespedeza (Bush Clover)—*Leguminosae*. Uncommon hardy sub-shrubs of herbaceous habit, similar in appearance and growth to *Desmodium* and *Indigofera*.

CULTURE: Soil, sandy loam. Position, sheltered, sunny borders. Plant, Oct. or Nov., Feb. or March. Prune slightly after flowering.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light soil in a sheltered position outdoors in Feb. or March; cuttings inserted in heat in spring; layering in spring.

SPECIES CULTIVATED: *L. bicolor*, rosy purple, Sept., 3 ft., China and Japan, and var. *alba*, white; *cuneata*, white and blue, Sept., 2 to 3 ft., Himalaya, China and Siberia; *Thunbergii* (syn. *L. Sieboldii*), purple, autumn, 5 ft., China and Japan.

Lettuce, see *Lactuca*.

Leucadendron—*Proteaceae*. Greenhouse evergreen tree with silvery silky leaves. In Cape Colony the leaves are utilised for ornamental purposes, especially by painting local scenes thereon. First introduced late seventeenth century.

CULTURE: Compost, equal parts sandy loam and peat, with some charcoal and sand. Position, light, airy greenhouse, free from damp in winter. Pot in March. Water moderately in summer, very little in winter. Temp., March to Oct. 60° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By seeds sown in sandy peat in a temp. of 55° to 65° directly they are imported; by cuttings of firm shoots in sand in a temp. of 55° in summer.

SPECIES CULTIVATED: *L. argenteum*, 'Cape Silver Tree', yellow, Aug., 15 ft., S. Africa.

Leucocrinum—*Liliaceae*. Hardy herbaceous perennials.

CULTURE: Sandy loam and a sunny pocket in the rock garden.

PROPAGATION: By seeds in sandy compost.

SPECIES CULTIVATED: *L. montanum*, 'Sand Lily', white, May, 6 in., N. America.

Leucocoryne—*Liliaceae* (or *Amaryllidaceae*). Half-hardy bulbous-rooted perennial. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, light rich sand. Position, sunny well-drained border. Plant, Sept. to Jan., placing bulbs 4 in. deep and 2 in. apart. Lift and replant annually.

POT CULTURE: Compost, two parts sandy loam and one part leaf-mould. Place five bulbs 3 in. deep in pot $4\frac{1}{2}$ in. in diameter. Plunge pots in peat in cold frame or under staging in cool greenhouse in sunny part of greenhouse or frame. Water moderately from time bulbs commence to grow until flowers fade, then gradually cease, keeping bulbs dry till growth recommences. Temp., Sept. to March 40° to 50° , March to Sept. 50° to 60° . Pot, Sept. to Oct.

PROPAGATION: By seeds sown in Feb. or March in sandy soil in temp. 55° to 60° ; by offsets detached when bulbs are lifted and grown on in same way.

SPECIES CULTIVATED: *L. ixioides* (syn. *L. odorata*), 'Glory of the Sun', blue, May to June, 12 to 18 in., Chile.

Leucogenes—*Compositae*. Hardy evergreen, dwarf, semi-shrubby plants.

CULTURE: Deep, well-drained gritty loam and a slightly shaded position or a cool aspect.

PROPAGATION: By seeds sown in spring or by cuttings of inch-long side shoots in early summer.

SPECIES CULTIVATED: *L. grandiceps*, 'New Zealand Edelweiss', white, early summer, 6 to 9 in., New Zealand.

Leucojum (Snowflake)—*Amaryllidaceae*. Hardy bulbous plants.

CULTURE: Soil, ordinary rich. Position, Summer Snowflake (*L. aestivum*) in sunny or shady borders or woodlands; Spring Snowflake (*L. vernal*) in shady borders or on rockeries. Both may also be naturalised in grass. Plant bulbs 4 in. deep and 3 in. apart, Aug. to Nov. Bulbs do not usually flower first year after planting, and only require to be lifted and replanted every five to eight years.

PROPAGATION: By offsets, removed and replanted in Sept. or Oct.

SPECIES CULTIVATED: *L. aestivum*, 'Summer Snowflake', white and green, May, 1 ft., Europe (Br.); *autumnale*, white and pink, autumn, 4 in., Medit. Region; *hyemale*, white and green, April, 9 in., Italy and S. France; *pulchellum* (syn. *L. Hernandezii*), white and green, May, 1 ft., Balearic Isles; *roseum*, rosy red, Sept. to Oct., 4 in., Corsica; *vernale*, 'Spring Snowflake', white and green, March, 1 ft., Europe, and var. *carpatum*, white and yellow.

Leucopogon—*Epacridaceae*. Greenhouse flowering evergreen shrubs. First introduced early nineteenth century.

CULTURE: Compost, three parts fibrous peat, one-part silver sand. Position, light, airy greenhouse Sept. to July, sunny place outdoors July to Sept. Repot, April, May or June; good drainage essential. Water moderately at all times. Syringe plants daily March to July. Temp., Sept. to March 40° to 50° , March to July 55° to 60° . Stimulants not essential.

PROPAGATION: By seeds sown immediately they ripen on surface of sandy peat under bell-glass in temp. 55° ; cuttings of ends of shoots inserted in pots of sandy peat covered with bell-glass placed in cool greenhouse in Aug. or April.

SPECIES CULTIVATED: *L. australis*, white, spring, 2 to 4 ft., Australia; *lanceolatus*, white, May, 8 to 10 ft.; *Reichei*, 'Australian Currant', white, May, 4 to 6 ft.; *verticillatus*, white or pink, summer, 3 to 6 ft., Australia.

Leucothoe—*Ericaceae*. Hardy evergreen flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Soil, peaty loam, lime-free. Position, open, sheltered borders. Plant, Sept., Oct., March or April. Pruning not necessary.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in sandy peat in cold frame, Feb. or March; layering shoots in Sept.; division, Oct. or Nov.

SPECIES CULTIVATED: *L. Catesbaei* (syn. *Andromeda Catesbaei*), white, May, 3 to 6 ft., an attractive shrub with arching growths, Georgia; *Davisii*, erect, sturdy habit, white, July, 3 ft., California; *Keiskei*, newer species, prettily coloured,

young foliage, flowers large, white, July, Japan; *racemosa* (syn. *Andromeda racemosa*), deciduous, free flowering, white, June, 6 ft., East U.S.A. See also *Lyonia*.

Lewisia (Bitter-wort)—*Portulacaceae*. Hardy herbaceous perennials. First introduced early nineteenth century.

CULTURE: Soil, equal parts sandy loam, peat and sand. Position, crevices of moist sunny rockeries. Plant, Sept., Oct., March or April. Water occasionally in dry weather. Leaves wither at the time of flowering, or may not be produced at all. Growing period above ground, about six weeks.

PROPAGATION: By seeds sown in well-drained pans of sandy loam and peat in a cool shady frame in March or April; division of the roots in March or April.

SPECIES CULTIVATED: *L. brachycalyx*, white or pink, May, 2 in., U.S.A.; *columbiana*, pale pink, May, 9 in., U.S.A., and vars. *alba* and *rosea*; *Cotyledon*, salmon-pink, May, 9 in., U.S.A.; *Finchii*, rose, May, 9 to 12 in., U.S.A.; *Heckneri*, salmon-pink, May, 9 in., U.S.A.; *Howellii*, apricot-pink, early summer, 3 in., Oregon; *Leana*, white or soft pink, May to June, 6 in., U.S.A.; *nevadensis*, pink, May, 3 in., U.S.A.; *oppositifolia*, white, May, June, 6 to 9 in., U.S.A.; *pygmaea*, pink or white, May, 2 in., U.S.A.; *rediviva*, 'Spatum', soft pink, May to June, 1 to 2 in., U.S.A.; *Tweedyi*, salmon-pink, May, 6 in., U.S.A.; *yosemitense*, white or rose, May, 4 to 6 in., U.S.A.

Leycesteria—*Caprifoliaceae*. Hardy deciduous flowering shrub. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny or shaded borders. Plant, Oct., Nov., Feb. or March. Prune hard back to old wood annually in April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 45° to 55° in March or April; cuttings of firm shoots inserted in sandy soil under hand-light in Sept. or Oct.

SPECIES CULTIVATED: *L. formosa*, 'Himalayan Honeysuckle', 'Flowering Nutmeg', half-woody green stems, attractive in winter, wine-coloured bracts and white flowers, very ornamental and useful for covert planting, June to September, Himalaya.

Lhotzkya—*Myrtaceae*. Greenhouse evergreen heath-like shrubs, limited to Australia. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy peat and loam. Position, well-drained pots in cool sunny greenhouse. Water copiously March to September, moderately at other times. Feed established plants with liquid manure.

PROPAGATION: By cuttings made from the young shoots when the base is firm, and inserted in pots of sandy peat under bell-glass during spring or late summer.

SPECIES CULTIVATED: *L. acutifolia*, yellow, June, 1½ ft., Australia; *ericoides*, pale yellow, June to July, 2 to 3 ft., Australia; *violacea*, purplish, June, 1½ ft., Australia.

Liatris (Blazing Star)—*Composita*. Hardy perennial herbs of strikingly erect habit. First introduced early eighteenth century.

CULTURE: Soil, light, rich, ordinary. Position, open, sunny beds or borders. Plant, Sept., Oct., March or April. Cut off decayed stems in Oct. Mulch with decayed manure in April. Water freely in dry weather.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light sandy soil outdoors in Aug. or Sept., transplanting seedlings the following May; division of plants in March or April.

SPECIES CULTIVATED: *L. elegans*, white, July to Sept., 3 to 4 ft., N. America; *graminifolia*, rosy mauve, July to Sept., 2 to 3 ft., N. America, and var. *dubia*, taller; *ligulistylis*, purple, summer, 1 to 1½ ft., Colorado; *pyncnostachya*, 'Button Snake-root', purple, Aug., 3 to 4 ft., N. America; *scariosa*, purple, Aug., 2 to 3 ft., N. America; *spicata*, purple, Aug., 4 to 5 ft., N. America.

Libertia—*Iridaceae*. Hardy evergreen perennials with sword-shaped or grass-like, graceful, dark green leaves. First introduced early nineteenth century.

CULTURE: Soil, equal parts sandy loam, peat and leaf-mould. Position, well-

drained sunny borders or, preferably, rockeries. Plant, Sept., Oct., March or April. Protect, Nov. to April, by covering with dry fern, tree leaves or strawy manure.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in cold frame or greenhouse, Aug. to Nov.; division of creeping rhizomes, March or April.

SPECIES CULTIVATED: *L. formosa*, white, June, 2 to 3 ft., Chile; *grandiflora*, white, June, 2 to 3 ft., New Zealand; *ixioides*, white, June, 2 ft., New Zealand.

Libocedrus—*Pinaceae* (or *Cupressaceae*). Hardy and slightly tender evergreen coniferous trees with scale-like leaves and small oblong cones. Pyramidal or columnar in habit. First introduced mid-nineteenth century.

CULTURE: Soil, rich loam with gravelly subsoil. Position, warm, sheltered. As specimens on lawns in mild districts in S. England only for *L. chilensis*, but *L. decurrens* is quite hardy. *L. plumosa* is only suitable for conservatory and winter-garden cultivation. Plant, Sept. to Nov.

PROPAGATION: By seeds in sandy soil in cold frame or greenhouse, Oct. to April; cuttings of firm shoots or branchlets in sandy soil in cold frame or under hand-light in Aug. or Sept.

SPECIES CULTIVATED: *L. chilensis*, 60 to 80 ft., Chile; *decurrens*, 'Incense Cedar', 100 to 150 ft., California; *plumosa* (syn. *L. Doniana*), 70 to 100 ft., New Zealand.

Libonia, see *Jacobinia pauciflora*.

Licuala—*Palmae*. Stove palms with fan-shaped green leaves. First introduced early nineteenth century.

CULTURE: Compost, two parts peat and one of loam and sand. Position, well-drained pots in light part of stove. Pot, Feb. to April. Water moderately Oct. to March, freely afterwards. Syringe twice daily March to Sept., once daily Sept. to March. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light rich soil in temp. 80° to 90°, Feb., March or April.

SPECIES CULTIVATED: *L. grandis* (syn. *Pritchardia grandis*), 10 ft., New Britain; *spinosa* (syn. *L. horrida*), 10 to 15 ft., Malaya, sometimes erroneously cultivated as *L. peltata*.

Ligularia—*Compositae*. Hardy herbaceous perennials, sometimes included in the genus *Senecio*.

CULTURE: Soil, loamy. Position, partly shady, moist border. *L. japonica* at edge of pond or lake or in damp soil nearby.

PROPAGATION: By seeds; cuttings; division.

SPECIES CULTIVATED: *L. clivorum*, orange-yellow, July to Sept., 4 to 5 ft., China and Japan; *Hessei*, orange, Aug. to Sept., 5 ft., hybrid; *japonica*, orange-yellow, July, 5 ft., Japan; *stenocephala*, orange-yellow, late summer, 4 ft., China and Japan; *tussilaginea* (syn. *L. Kaempferi*, *Senecio Kaempferi*), yellow, 1 to 2 ft., Japan, and vars. *aureo-maculata* and *argentea*; *Veitchiana*, yellow, summer, 3 ft., W. China; *Wilsoniana*, golden yellow, summer, 3 to 5 ft., China.

Ligustrum (Privet)—*Oleaceae*. Hardy deciduous and evergreen shrubs. Insignificant white flowers in panicles, odorous but not always pleasantly so, followed by black or yellow berries. Of no great ornamental value but useful for screening in shady places, in sunless town gardens and as pheasant cover.

CULTURE: Soil, ordinary. Position, common species in shrubberies, under shade of trees or as hedges; others in open shrubberies. Plant deciduous kinds Oct. to Feb., others Oct. to April. Prune deciduous species in autumn, evergreen in April.

HEDGE CULTURE: Soil, ordinary, trenched two spits deep and 3 ft. wide. Plant privet (1 to 3 ft. high), $1\frac{1}{2}$ to 2 ft. apart, Oct. to April. Trim into shape in June and July. Privet and hawthorn planted alternately make a splendid hedge. The best evergreen species for screening is *L. lucidum*, and *L. ovalifolium* and its vars. for hedges.

PROPAGATION: By seeds in open ground in Nov., transplanting the largest seedlings the following Oct., the remainder the next year; cuttings of young shoots in shady position or under hand-light in summer; cuttings of firm shoots 8 to 12 in. long in shady position outdoors, Sept. to Nov.

SPECIES CULTIVATED: *L. lucidum*, broad, lustrous foliage, 10 to 18 ft., China, and vars. *tricolor*, variegated leaves, *compactum*, dense growth, etc.; *ovalifolium*, semi-evergreen, Japan, and vars. *aureo-marginatum*, 'Golden Privet', *variegatum*, variegated; *Quihoui*, 6 to 10 ft., deciduous, China; *sinense*, 10 to 20 ft., deciduous, the best flowering species, white, July, China; *vulgare*, 'Common Privet', deciduous, 6 to 10 ft., Britain, and var. *xanthocarpum*, yellow berried.

Lilac, see *Syringa*; **Californian**-, see *Ceanothus integerrimus*.

Lilium (Lily)—*Liliaceae*. Hardy and half-hardy bulbous flowering plants. Some species formerly included in *Lilium* are now referred to other genera; see *Cardiocrinum* for *L. giganteum*, *Nomocharis* for *L. apertum*, *Notholirion* for *L. Thomsonianum*. First introduced in Middle Ages (before 1400).

CULTURE: Soil, ordinary well drained, with decayed leaf-mould and sand added if soil is at all heavy, for *L. amabile*, *bulbiferum*, *bulbiferum croceum*, *candidum*, *chalcedonicum*, *concolor*, *dauricum*, *Davidii*, *formosanum*, *Hansonii*, *Henryi*, *hollandicum*, *longiflorum*, *maculatum*, *Martagon*, *pomponium*, *pumilum*, *pyrenaicum*, *regale*, *tigrinum* and *testaceum*. Lime-free loam, fibrous peat, leaf-mould and sand for *L. auratum*, *Brownii*, *Humboldtii*, *speciosum* and *sulphureum*; *L. monadelphum* and *Szovitsianum* do well in rather heavy loam if it is well drained. Peaty loam, leaf-mould and sand, well drained but with abundant moisture in summer and a half-shady position for *L. canadense*, *Grayi*, *japonicum*, *michiganense*, *pardalinum*, *Parryi*, *philadelphicum*, *rubellum*, *superbum* and *Washingtonianum*. Plant *L. candidum* in Aug. or Sept., others Oct. or Nov.; see that basal roots are damaged as little as possible. Plant stem-rooting lilies, such as *L. amabile*, *auratum*, *Brownii*, *bulbiferum croceum*, *Davidii*, *Hansonii*, *hollandicum*, *Henryi*, *Horfordii*, *leucanthum*, *maculatum*, *philippinense*, *primulinum*, *pumilum*, *regale*, *Sargentiae*, *speciosum*, *sulphureum* and *tigrinum*, 6 in. deep and 6 in. or more apart and draw soil round the stems as growth progresses. Only just cover the bulb of *L. candidum* with soil. Other lilies plant 4 in. deep. Place a handful of silver sand under each bulb and a little round it. Mulch with leaf-mould in April. Protect *L. leucanthum*, *philadelphicum*, etc., against excessive wet in winter by a pane of glass or other cover above the bulbs. Do not cut down flower stems before the leaves have turned yellow. Water freely in very dry weather. To prevent spread of virus diseases spray continually against aphides. Any plants showing signs of virus infection (e.g. mottling or streaking and twisting of leaves or deformity of flowers due to adhering of petal tips) should be burned as soon as possible. Do not handle a healthy plant after touching a virus-infected one. Many lilies become virus-infected in the propagating frame when diseased stock and healthy stock are propagated side by side. *L. tigrinum* often carries virus disease.

POT CULTURE: Compost, equal parts loam, leaf-mould, decayed manure and sand. Pot, Sept. to March, placing one bulb in a 5 or 6 in. pot or three in an 8 or 10 in. pot. For stem-rooting kinds put $\frac{1}{4}$ drainage, then half-fill with compost, place bulbs thereon and cover them with $\frac{1}{4}$ in. of compost, top-dress with similar compost as growth progresses. Other kinds may be potted about 3 in. deep in the ordinary way. After potting, place pots in cold frame, greenhouse or shed and cover with 2 in. of cinder ashes or peat. Allow them to remain thus till growth begins, then remove to light airy part of greenhouse or to window or cool room till they flower, then stand outdoors. Water moderately when growth begins, freely when in full growth. Temp. for forcing *L. longiflorum*, *neilgherrense* and *philippinense*, 55° to 65°. Repot *L. longiflorum* annually in Sept., others in Oct. or Nov. and treat as advised for first potting. After flowering, place plants in sunny position outdoors, gradually withhold water and keep quite dry from Oct. to Feb. *L. longiflorum*, however, should never be kept quite dry—only moderately so for six weeks then watered as before. Species most suitable for

indoor culture are *L. longiflorum*, *neilgherrense*, *primulinum*, *philippinense*, *speciosum* and *sulphureum*.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pans or boxes of sandy soil in cold frame in autumn or spring, transplanting seedlings when large enough to handle into similar soil in boxes and, when two years old, into specially prepared bed outdoors; offsets or bulbils planted 1 in. deep and 2 or 3 in. apart in boxes of sandy soil, or in similar soil in sunny cold frame, in autumn; plump scales, broken from bulb just after flowering, planted in drills 2 in. deep outdoors or in boxes of sand and moist peat. Take care not to injure roots when transplanting.

TENDER SPECIES CULTIVATED: Those best grown under glass are—*L. Bakerianum*, white, June, 1 to 3 ft., Burma, and vars. *aureum*, yellow, *Delavayi*, greenish-yellow, *rubrum*, rose, *yunnanense*, white; *formosanum*, white, 2 to 6 ft., Formosa; *longiflorum*, 'Easter Lily', white, 1 to 3 ft., Japan, and many vars. including *eximium* (syn. *L. Harrisii*), 'Bermuda Lily'; *neilgherrense*, white, 2 to 3 ft., Aug. to Sept., S. India; *nepalense*, greenish-yellow and purple-brown, May to July, 3 ft., N. India (Himalaya); *nobilissimum*, white, July, $1\frac{1}{2}$ to 2 ft., Japan; *philippinense*, white, July to Sept., 1 to 3 ft., Philippine Islands (Luzon); *primulinum*, yellow, July to Sept., 2 to 8 ft., Burma, and vars. *burmanicum*, primrose yellow, *ochraceum*, heavily blotched with purple in the throat; *sulphureum*, deep yellow inside, often pink-flushed outside, tips white, 4 to 10 ft., Burma W., China; *Wallichianum*, white, Sept., 2 to 6 ft., N. India (Himalaya).

HARDY SPECIES CULTIVATED: *L. amabile*, red, July, $1\frac{1}{2}$ to 3 ft., Korea, and var. *luteum*, yellow; *auratum*, 'Golden-rayed Lily', white, yellow and crimson, Aug. to Sept., 3 to 8 ft., Japan, and many vars.; *aurelianense*, yellow-orange and white, July, 4 to 8 ft., hybrid; 'Backhouse Hybrids', orange, yellow, cream or pink, June to July, 5 to 6 ft., hybrid; 'Bellingham Hybrids', red, orange or yellow, spotted brown or red, July, 4 to 7 ft., hybrid; *Bolanderi*, brick-red, July, 1 to 3 ft., Oregon, California; *Brownii*, white, rose-purple outside, July, 3 to 4 ft., China, and var. *viridulum* (syn. *L. Brownii colchesteri*) and *australe*, white, greenish or purplish outside; *bulbiferum*, red and orange, July, 3 to 4 ft., Cent. Europe, and var. *croceum* (syns. *L. croceum*, *L. aurantiacum*), orange; *Burbankii*, saffron-yellow, July, 2 to 7 ft., hybrid; *callosum*, dull red, Aug., 1 to 3 ft., China, Japan; *canadense*, yellow and red, July, 2 to 5 ft., Eastern N. America; *candidum*, 'Madonna Lily', white, July, 4 to 6 ft., E. Medit. Region; *carniolicum*, red, July, 1 to 3 ft., Balkan Peninsula, and var. *Jankae*, yellow; *cernuum*, purplish pink, June to July, 1 to 3 ft., Korea, Manchuria; *chalconicum*, red, July, 3 to $4\frac{1}{2}$ ft., Greece, and var. *maculatum*, red, black-spotted; *columbianum*, orange-yellow, July to Aug., 2 to 5 ft., Western N. America; *concolor*, scarlet, June to July, 1 to 3 ft., Cent. China, and many vars.; *Dalhansonii*, reddish maroon, June to July, 4 to 6 ft., hybrid; *dauricum*, red, June, 1 to $2\frac{1}{2}$ ft., N.E. Asia; *Davidii*, orange, July to Aug., 3 to $4\frac{1}{2}$ ft., W. China, and var. *unicolor* (syns. *L. sutchuenense* hort., *L. Willmottiae* var. *unicolor*) and *Willmottiae* (syn. *L. Willmottiae*); *Duchartrei* (syn. *L. Farreri*), white, purple-spotted, July, 2 to 4 ft., W. China; *formosanum* (syn. *L. philippinense* var. *formosanum*), white, often purplish outside, Aug. to Sept., 2 to 6 ft., Formosa, and var. *Pricei*, 1 to 2 ft.; *Grayi*, crimson and orange, July, $2\frac{1}{2}$ to 4 ft., Eastern N. America (Alleghanies); *Hansonii*, orange, June to July, 4 to 5 ft., Korea; *Henryi*, orange, Aug., $4\frac{1}{2}$ to 10 ft., Cent. China; *hollandicum* (syn. *L. umbellatum* hort.), yellow, orange, apricot or red, June to July, $1\frac{1}{2}$ to $2\frac{1}{2}$ ft., hybrid; *Horsfordii*, orange, July to Aug., 4 to 6 ft., hybrid; *Humboldtii*, orange, maroon-spotted, July, 4 to 6 ft., California, and var. *Bloomerianum*, 2 to 3 ft., and *ocellatum* (syn. var. *magnificum*), 4 to 6 ft.; *imperiale* (syn. *L. princeps*), white, yellow in throat, purplish outside, July, 4 to 6 ft., hybrid; *iridollae*, yellow, Aug., 3 to 5 ft., S.E. United States; *japonicum* (syns. *L. Krameri*, *L. Makinoi*), rose-pink, $1\frac{1}{2}$ to 3 ft., Japan; *Kelloggii*, pinkish-mauve, July, $1\frac{1}{2}$ to 4 ft., California, Oregon; *Kesselringianum*, straw-yellow, July, 2 ft., Caucasus; *lankongense*, rose, July to Aug., 2 to 4 ft., W. China; *Leichtlinii*, yellow, Aug., 2 to 4 ft., Japan, and var. *Maximowiczii* (syns. *L. pseudo-tigrinum*, *L. Maximowiczii*), cinnabar-red, 2 to 8 ft.; *leucanthum*, white, July to Aug., 3 to 4 ft., Cent. China, and var. *centifolium*, white,

rose-purple outside, 4 to 9 ft.; *maculatum* (syns. *L. elegans*, *L. Thunbergianum*), yellow, orange, apricot or red, June to July, 9 to 24 in., Japan; *Manglesii*, orange, dark-spotted, July, 4 to 5 ft., hybrid; *maritimum*, dark reddish-orange, July, 1½ to 3 ft., California; *Martagon*, dull purple, July, 3 to 6 ft., Europe, N. Asia, and many vars. including *album*, white, *Cattaniae*, dark red unspotted, *sanguineo-purpureum*, dark purple, spotted, *plenum*, dull purple, double; *medeoloides*, red, July, 1 to 3 ft., Japan to Kamchatka; *Michauxii* (syn. *L. carolinianum*), orange-red, 1 to 3½ ft., Eastern U.S.A.; *michiganense*, orange-red, July, 2 to 5 ft., E. Canada and U.S.A.; *monadelphum*, yellow, June to July, 4 to 5 ft., Caucasus; *nevadense* (syn. *L. pardalinum nevadense*), orange-yellow, July, 2 to 5 ft., California; *occidentale*, orange-red, July, 2 to 6 ft., California, Oregon; *papilliferum*, dark red, July, 1 to 3 ft., W. China; *pardalinum*, 'Panther Lily', 'Leopard Lily', orange and crimson, July, 4 to 7 ft., California, and many vars. including *giganteum*, 'Sunset Lily', 3 to 8 ft.; *Parkmannii*, white and crimson, Aug., 4 ft., hybrid; *Parryi*, yellow, July, 2 to 6 ft., California, Arizona; *parvum*, orange, yellow or dark red, July, 3 to 4 ft., California, Oregon; *philadelphicum*, orange-scarlet, boldly spotted, June to July, 1½ to 3 ft., N. America; *polyphyllum*, white, lilac-spotted, July, 1½ to 4 ft., Himalaya; *pomponium*, red, June to July, 1½ to 2½ ft., Maritime Alps; *ponticum*, dull yellow and purple, July, 3 to 4½ ft., Caucasus; *pumilum* (syn. *L. tenuifolium*), red, June, 1 to 2 ft., E. Asia; *pyrenaicum*, greenish-yellow, May to June, 1 to 4½ ft., Pyrenees, and var. *rubrum*, red; *regale*, white with yellow throat and rose-purple exterior, July, 3 to 6 ft., W. China; *rubellum*, rose-pink, May to June, 1½ to 2½ ft., Japan; *rubescens*, pinkish-purple, June to July, 2 to 4 ft., California, Oregon; *Sargentiae*, white, yellow throat and purple-brown exterior, July, 4 to 5 ft., W. China; *Scottiae*, orange, June, 1½ to 2½ ft., hybrid; *speciosum* (syn. *L. lancifolium* hort.), white and crimson, Aug. to Sept., 3 to 6 ft., Japan, and many vars.; *sulphureum*, white with yellow throat, often flushed pink outside, Aug. to Sept., 4 to 8 ft., China; *superbum*, orange with crimson tips, July, 5 to 9 ft., Eastern U.S.A.; *Szovitsianum*, yellow, June, 2½ to 5 ft., Caucasus; *taliense*, white, purple-spotted, June, 2 to 4 ft., W. China; *testaceum*, 'Nankeen Lily', pale apricot, June to July, 4 to 6 ft., hybrid; *tigrinum*, 'Tiger Lily', orange, July to Sept., 4 to 6 ft., China, Japan, and many vars. including *Fortunei* and *splendens*; *tsingtauense*, orange, June, 1½ to 3 ft., China, Korea; *Wardii*, rose-pink, July to Aug., 3 to 5 ft., S.E. Tibet; *Washingtonianum*, white to lilac-purple, June to July, 4 ft., California, Oregon.

Lily, see *Lilium*; **-of the Valley**, see *Convallaria*; **Flax-**, see *Dianella*;

Paroo-, see *Dianella*; **-Thorn**, see *Catesbaea spinosa*.

Lime Fruit, see *Citrus aurantifolia*; **-Tree**, see *Tilia*.

Limnanthemum, see *Nymphoides*.

Limnanthes—*Limnanthaceae*. Hardy annual. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, in masses, edges of sunny beds, or on rockeries. Sow for spring flowering in Sept., for summer flowering in April.

PROPAGATION: By seeds sown where plants are required to flower, Sept. or April.

SPECIES CULTIVATED: *L. Douglasii*, yellow and white, April to Sept., 1 ft., fragrant, N.W. America.

Limnobia—*Hydrocharitaceae*. Tender floating aquatics used in tropical aquariums.

CULTURE: Soil, loam and charcoal covered with several inches of water. Position, in small pans, prepared as above, in light place on window-sill, greenhouse bench or dropped on surface of warm water aquariums. Temp., March to Oct. 70° to 85°, Oct. to March 60° to 70°. Plant, any time.

PROPAGATION: By division.

SPECIES CULTIVATED: *L. Boscii* (syn. *L. spongia*), resembles the native Frogbit,

Trop. America; *stoloniferum* (syn. *Trianea bogotensis*), fleshy, dark green, Trop. America.

Limnocharis—*Butomaceae*. Stove aquatic perennial. First introduced early nineteenth century.

CULTURE: Compost, sandy loam. Position, in shallow tubs, cisterns or aquariums in sunny place. Plant 3 to 6 in. below surface of water, in March or April. Temp., March to Sept. 60° to 70°, Sept. to March 50° to 60°.

PROPAGATION: By seeds sown in soil below water in March or April; division of plants in April.

SPECIES CULTIVATED: *L. flava* (syns. *L. emarginata* and *L. Plumieri*), yellow, July, S. America. See also Hydrocleys.

Limonium (Sea Lavender)—*Plumbaginaceae*. Greenhouse evergreens and half-hardy and hardy herbaceous perennials. Formerly known as *Statice*.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts sandy fibrous loam, one part fibrous peat and one part sand. Pot, March or April. Position, light airy sunny greenhouse, Sept. to May; cold frame, May to Sept. Water freely April to Sept., moderately afterwards. Apply weak stimulants occasionally in summer to healthy established plants. Temp., Sept. to April 40° to 50°, April to May 55° to 65°. Good drainage in pots indispensable.

CULTURE OF PERENNIAL SPECIES: Soil, sandy loam. Position, sunny rockeries or borders. Plant, March or April.

CULTURE OF ANNUAL SPECIES: Soil, ordinary sandy. Position, sunny borders or rockeries. Sow seeds in well-drained pots filled with sandy loam, cover slightly with fine soil, place in temp. 55° to 65°, Feb. or March. Transplant when large enough to handle; harden off and plant outdoors in May.

PROPAGATION: By seeds sown in pans of sandy soil in temp. 55° to 60° in Feb. or March; cuttings of roots inserted in similar soil and cold frame in Feb. or March.

GREENHOUSE SPECIES CULTIVATED: *L. fruticans*, blue, summer, Canaries; *imbricatum*, blue, summer, 1½ ft., Tenerife; *macrophyllum* (syn. *L. Halfordii*), blue, June, 1 to 2 ft., Canaries; *profusum*, blue, summer, 2 to 3 ft., hybrid.

PERENNIAL SPECIES CULTIVATED: *L. bellidifolium* (syn. *Statice caspia*), lavender, summer, 6 in., Europe; *eximium*, rosy lilac, summer, 1 ft., Cent. Asia; *Gmelinii*, blue and rose, summer, 1 to 2 ft., Caucasus; *latifolium*, blue, 2 to 3 ft., Bulgaria, and var. *grandiflorum*; *Mouretii* (syn. *S. Mouretii*), brown and white, summer, 1 to 2 ft., Morocco; *sinense*, yellow, summer, 1 ft., China; *tataricum*, red and white, summer, 1 ft., Caucasus; *vulgare* (syn. *Statice Limonium*), 'Common Sea Lavender', purple, summer, 1 ft., Europe (Br.).

ANNUAL SPECIES CULTIVATED: *L. Bonduellii*, yellow, summer, 1 to 2 ft., Algeria; *sinuatum*, blue and cream, summer, 1 to 2 ft., Medit. Region, and several colour forms, really a perennial but always grown as an annual; *spicatum*, rose or white, summer, 6 in., W. Asia; *Suworowii*, lilac and pink, summer, 18 in., Cent. Asia.

Limnophila—*Scrophulariaceae*. Tender aquatic or semi-aquatic plants for the tropical tank or aquarium.

CULTURE: Soil, loam with charcoal or aquarium compost. Position, fair amount of light for the semi-aquatics, more subdued for the under-water forms. plant, spring or summer.

PROPAGATION: By division.

SPECIES CULTIVATED: *L. gratioloides*, blue, resinous smell, 6 in., India; *heterophylla* (also known as *Ambulia*), submerged for aquarium, feathery leaves, Trop. Asia; *sessiliflora*, fleshy stems and leaves, bluish-white, Trop. Asia.

Linanthus, see *Gilia*.

Linaria (Toadflax)—*Scrophulariaceae*. Hardy annual and perennial herbs. Some species formerly included in this genus have been transferred to *Cymbalaria*, *Kickxia* and *Chaenorhinum*.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary, mixed with grit or old mortar. Position, moist rockeries or margin of borders; open, sunny borders for *L. dalmatica*, *purpurea*, *vulgaris* and *triornithophora*. Plant, Oct., Nov., March or April.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in patches in April for flowering in summer; in Aug. for flowering in spring. *L. tristis*, a pretty dwarf annual for beds or rockeries.

PROPAGATION: By seeds sown where plants are required to flower, Sept. or April.

ANNUAL SPECIES CULTIVATED: *L. bipartita*, violet-purple with orange, summer, 1 ft., Portugal, N. Africa, and vars. *alba*, white, *splendida*, deep purple; *Broussonetii* (syn. *L. multipunctata*), yellow and brown, summer, 6 in., Medit. Region; *delphinoides*, red-violet to pale lilac, summer, $1\frac{1}{2}$ ft., Spain; *faucicola*, deep lavender, all summer, 4 in., Spain; *heterophylla* (syn. *L. aparinoides*), straw-coloured and yellow, summer, 1 to 3 ft., Morocco; *maroccana*, red-purple, June, 9 to 12 in., Morocco; *reticulata*, purple and yellow, summer, 2 to 4 ft., Portugal; *tristis*, yellow and brown, July, 12 in., Medit. Region.

PERENNIAL SPECIES CULTIVATED: *L. alpina*, blue, violet and yellow, summer, 6 in., Alps; *dalmatica*, yellow, summer, 3 to 5 ft., S.E. Europe; *purpurea*, purple, summer, 2 to 3 ft., S. Europe; *supina*, yellow, all summer, 6 in., Spain; *triornithophora*, purple and yellow, summer, 1 to 3 ft., Portugal, Spain; *ventricosa*, pale yellow with red-brown veining, summer, 3 ft., Morocco; *vulgaris*, 'Common Toadflax', 'Butter and Eggs', yellow, summer, 2 ft., Europe (Br.).

Lincolnshire Asparagus, see *Chenopodium Bonus-Henricus*.

Lindelofia—*Boraginaceae*. Hardy perennial herb. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny well-drained borders. Plant, Oct., March or April. Cut off flower stems, Sept. Apply weak liquid manure occasionally during flowering period, or dig decayed manure into surface of soil round base of plants in March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in sunny position outdoors in April or May, transplanting seedlings following Aug. or Sept. for flowering the next year; division of roots in March.

SPECIES CULTIVATED: *L. longifolia* (syn. *L. spectabilis*), 'Himalayan Lung-wort', purple, July, 18 in., Himalaya.

Linden, see *Tilia*.

Lindera—*Lauraceae*. Hardy and slightly tender deciduous and evergreen flowering trees; aromatic, but of little ornamental value. The genus was at one time known as *Benzoin*. First introduced late seventeenth century.

CULTURE: Soil, ordinary. Position, open, sunny shrubberies or borders. Plant, Oct. to Feb. Prune into shape when necessary after flowering.

PROPAGATION: By cuttings of shoots, 6 to 8 in. long, inserted in sandy soil in shady, sheltered position outdoors, Oct. to Nov.; layering in spring.

SPECIES CULTIVATED: *L. Benzoin*, 'Benjamin Bush', 'Spice Bush', deciduous, yellow, spring, 15 to 20 ft.; *megaphylla*, evergreen, black fruits, 15 to 20 ft., Cent. China; *obtusiloba*, deciduous, yellow, black fruits, March to April, 20 to 25 ft., Japan and Korea; *praecox*, yellow, March, 8 ft., Japan and Korea.

Lindsaya—*Polypodiaceae*. Greenhouse evergreen ferns. Fronds, feather-, kidney- or arrow-shaped. First introduced early nineteenth century.

CULTURE: Compost, two parts turfy loam, one part lumpy peat, and one part equal proportions of broken crocks, charcoal and sand. Position, moist, shady part of stove, in wardian case, or under bell-glasses. Pot very firmly in well-drained pots, Feb. or March. Water abundantly March to Oct., moderately afterwards. Temp., March to Sept. 55° to 65° , Sept. to March 50° to 55° .

PROPAGATION: By spores sown on fine sandy peat, in well-drained pans under bell-glass, in temp. 55° to 65° at any time.

SPECIES CULTIVATED: *L. cuneata* (syn. *L. trichomanoides*), 6 in., New Zealand; *linearis*, 6 in., New Zealand.

Ling, see *Calluna vulgaris*.

Linnaea—*Caprifoliaceae*. Dainty creeping hardy shrub, found wild in N.E. Britain.

CULTURE: Soil, light. Position, shady, moist, suitable for rockery or wild garden.

PROPAGATION: By seed sown in sandy soil in frame, April.

SPECIES CULTIVATED: *L. borealis*, 'Twin-flower', creeping, pink or white, fragrant, summer, circumpolar, and var. *americana*, slightly larger and more easy to grow.

Linseed Oil Plant, see *Linum usitatissimum*.

Lion's-ear, see *Leonotis Leonurus*.

Linum (Flax)—*Linaceae*. Hardy annuals, perennials and shrubs.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in April, in lines or masses where plants are required to flower.

CULTURE OF PERENNIAL SPECIES: Soil, good ordinary. Position, sunny rockeries, borders or banks. Plant, Oct. to Nov. or Feb. to April.

CULTURE OF HARDY SHRUBBY SPECIES: Soil, sandy loam, leaf-mould, peat and sand. Position, warm, sheltered rockeries or dry walls. Plant, Oct. or Nov. Prune straggling shoots into shape, March or April.

CULTURE OF *L. GRANDIFLORUM* IN POTS: Soil, any good compost. Sow seeds $\frac{1}{16}$ in. deep in April in 6 in. pots. Place pots in cold frame or shady window till seedlings appear, then remove to full light. Water moderately at first, freely afterwards. Support shoots by inserting small twiggy branches between them. Sow again in July, plunging pots to rim in garden soil, and keep well supplied with water to flower in autumn.

PROPAGATION: Perennial species by seeds sown $\frac{1}{2}$ in. deep outdoors in April, also by division in March or April; shrubby species by cuttings of young shoots inserted in sandy soil under bell-glass in brisk bottom heat during June or July.

ANNUAL SPECIES CULTIVATED: *L. grandiflorum*, rose, summer, 1 ft., Algeria, and vars. *coccineum*, scarlet, *splendens*, rose, and *rubrum*, red; *usitatissimum*, 'Linseed Oil Plant', blue, June, 18 in., Europe.

PERENNIAL SPECIES CULTIVATED: *L. alpinum*, blue, summer, 6 in., Europe; *campanulatum*, yellow, summer, 1 ft., Europe; *capitatum*, yellow, June to July, 6 to 9 in., Europe; *flavum*, yellow, summer, 18 in., Austria; *monogynum*, white, June to Oct., 1 to 2 ft., New Zealand; *narbonneuse*, blue, May to July, 2 ft., S. Europe; *perenne*, blue or white, summer, 18 in., Britain; *salsoloides*, white, tinged pink, June to July, 9 in., S.W. Europe. See also *Reinwardtia*.

SHRUBBY SPECIES CULTIVATED: *L. arboreum*, yellow, June, 1 ft., Crete.

Liparis—*Orchidaceae*. A large terrestrial and epiphytic genus, very variable, widely distributed. Pseudo-bulbs may be evident, or the leaf base forms a short stem, more or less swollen. Flowers in terminal racemes, often numerous, usually very small.

CULTURE: Compost, three parts of osmunda or peat fibre, two parts of sphagnum moss with crushed potsherds. Terrestrial kinds should have an addition of loam. Species from tropical countries require a warm moist atmosphere and rather shady position. Winter temp. 60° to 65°, higher in summer. Rest requires consideration, with very few should it be drastic but must vary with the species. If the foliage remains fresh, none, for kinds in which the leaves are not persistent, or with pseudo-bulbs, dryer, cooler conditions. The English representative, though said to be inclined to be epiphytic, has succeeded in a mixture of leaf-mould and brick dust. It grows in spongy bogs.

PROPAGATION: By the division of suitable plants in spring.

SPECIES CULTIVATED: A selection—*L. atropurpurea*, purple, summer, Ceylon;

atrosanguinea (syn. *L. tabulare*), purple-maroon, summer, Perak; *elata*, variable, 1 ft. or more high, greenish, reddish-purple or yellowish-white, summer, America; *fulgens*, deep red, summer, Philippines; *lacerata*, yellowish, lip reddish, lacerated, summer, Borneo; *Loeselii*, small, yellowish, Europe (Br.), N. America; *reflexa*, yellowish-green to orange, autumn, Australia; *tricallosa*, yellowish changing to purple, summer, Malaya, Borneo; *Walkeriae*, dwarf, purplish, green shaded, summer, Ceylon.

Lip Fern, see *Cheilanthes*.

Lippia—*Verbenaceae*. Greenhouse deciduous shrub. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, pots in windows or greenhouse; beds outdoors against south walls in S. England and Ireland only. Pot or plant, March. Water freely March to Sept., little afterwards. Prune shoots reb. to within an inch of base. Temp., 45° to 50° in winter, 50° to 55° other times.

PROPAGATION: By cuttings pulled off stem when 4 in. long and inserted in sandy soil under bell-glass in temp. 65° in March.

SPECIES CULTIVATED: *L. citriodora* (syn. *Aloysia citriodora*), 'Lemon Scented Verbena', lilac, Aug., foliage fragrant, 10 to 15 ft., Argentine, Chile.

Liquidambar—*Hamamelidaceae*. Hardy deciduous flowering trees. Flowers greenish-yellow, inconspicuous; spring. Leaves, downy, very fragrant, palmate. First introduced late seventeenth century.

CULTURE: Soil, deep, moist loam. Position, sheltered in shrubberies or on lawns. Plant, Oct. to Dec. Prune into shape when necessary in Nov.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in sandy soil outdoors, Oct., Nov., March or April, transplanting seedlings two to three years afterwards; layering shoots, in spring.

SPECIES CULTIVATED: *L. formosana* (syn. *L. acerifolia*), 60 to 80 ft., China; *orientalis*, 80 to 100 ft., Asia Minor; *Styraciflua*, 'Sweet Gum', 100 to 150 ft., U. States. In this country these trees do not usually attain more than half the heights stated.

Liquorice-plant, see *Glycyrrhiza glabra*.

Liriodendron—*Magnoliaceae*. Hardy deciduous tree with tulip-shaped flowers and bright green leaves turning gold in autumn. First introduced mid-seventeenth century.

CULTURE: Soil, deep rich loam. Position, sunny, sheltered shrubberies, or as specimen on lawn. Plant, Oct. to Feb. Prune straggling shoots into shape Nov. or Dec.

PROPAGATION: By seeds in moist, sandy loam in sheltered position outdoors, Sept. to Nov.; layering in spring.

SPECIES CULTIVATED: *L. Tulipifera*, 'Tulip Tree', yellow, 100 to 200 ft., N. America, numerous forms in cultivation including *aureo-maculatum*, bright gold-mottled leaves, and *fastigiatum*, columnar in habit.

Liriope—*Liliaceae*. Hardy evergreen perennials. Grass-like foliage in tufts. First introduced early nineteenth century.

CULTURE: Soil, sandy loam. Position, as an edging to beds in the open or as a small pot plant in cool greenhouse or conservatory. Plant or pot, March to April.

PROPAGATION: By division at planting time.

SPECIES CULTIVATED: *L. Muscari*, lilac, autumn, 1 to 1½ ft., Japan and China; *spicata*, pale lilac to white, autumn, creeping, China and Japan.

Lissochilus—*Orchidaceae*. Terrestrial orchids. About 100 tuberous-rooted or with rhizomatous pseudo-bulbs, just below or on the soil surface. Spikes simple, from rhizome or base of pseudo-bulbs. Flowers showy, many.

CULTURE: Compost, three parts fibrous loam, one part leaf-mould, silver sand and chopped sphagnum. Position, shallow pans or well-drained pots in warm,

moist part of stove during the growing period and cool part when at rest. Pot, Feb. or March. Water freely March to Sept., moderately Sept. to Nov., keeping quite dry Nov. to March. Temp., March to Oct. 65° to 80°, Oct. to March 60° to 65°. Growing period, March to Oct.; resting period, Oct. to March. Expose to full light in autumn, and in summer shade lightly.

PROPAGATION: By division of plants, March.

SPECIES CULTIVATED: A selection—*L. arenarius*, green, suffused brown-red, mauve-purple, yellow, variable, summer, Trop. Africa, Natal; *bellus*, greenish-yellow, reddish, spring, autumn, Nyasaland; *giganteus*, rose-lilac, lip bright purple, autumn, 10 to 16 ft., River Congo; *Horsfallii*, purple, rose, violet, summer, autumn, 4 to 6 ft., W. Africa; *Krebsii*, yellow, red-brown, lip with two purple blotches, spring, summer, 2 to 4 ft., Natal, and var. *purpuratus*, purplish-brown, yellow; *roseus*, brown, deep rose, summer, Sierra Leone; *speciosus*, variable, fragrant, yellow, purplish, lip whitish, purple feathered, 3 to 7 ft., summer, S. Africa.

Listera—*Orchidaceae*. A terrestrial genus, widely distributed. Stems from fibrous roots.

CULTURE: The two English species are not very exigent as to soil and situation, but *L. cordata* prefers rather boggy ground. Some of the exotic species might be hardy.

PROPAGATION: By offsets if they occur.

SPECIES CULTIVATED: *L. cordata*, small, brownish, greenish-brown, summer, Europe (Br.), N. America; *ovata*, 'Twayblade', many, small, green to yellowish-green, curiously scented, spring, summer, Europe (Br.), and var. *variegata*, leaves banded yellow.

Lithodora, see *Lithospermum*.

Lithops (Stone-face, Living Stones)—*Aizoaceae*. Greenhouse succulent plants.

CULTURE: Compost, six parts sharp sand, four parts rich loam, one part each mortar rubble and brick dust. Position, well-drained pots in sunny greenhouse or window, or bed on greenhouse staging; very light in winter. Plant or pot, April or May, burying $\frac{1}{4}$ of plant-body. Keep fairly moist May to Nov., completely dry Dec. to April. Temp., Dec. to April 60°, May to Nov. 60° or over.

PROPAGATION: By seeds sown in close atmosphere, temp. 55° to 60°, April or Sept.; the plant-bodies can be used as cuttings, leaving a short section of stem below the body and removing skin from same; dry well before insertion, May or June, temp. 65°.

SPECIES CULTIVATED: *L. bella* (syn. *Mesembryanthemum bellum*), white, Sept. to Nov., S.W. Africa; *Comptonii*, yellow, Sept., S.W. Africa; *Lesliei* (syn. *M. Lesliei*, *M. ferrugineum*), yellow, Sept., S.W. Africa; *olivacea*, yellow, S.W. Africa; *pseudotruncatella* (syn. *L. farinosa*, *M. pseudotruncatellum*), yellow, Sept. to Oct., S.W. Africa.

Lithospermum (Gromwell)—*Boraginaceae*. Hardy dwarf, trailing, evergreen flowering shrubs and perennials.

CULTURE: Soil, sandy or loamy. Position, margins of sunny borders or on ledges of sunny rock gardens. Plant, Oct., Nov., March or April. *L. diffusa* is an excellent plant for draping stones on rockeries.

PROPAGATION: By seeds in well-drained pots of sandy soil in cold frame in March or April, transplanting seedlings when an inch high singly into 2 in. pots and growing in frame till following spring; cuttings of ripened shoots, 2 to 3 in. long, in well-drained pots of sandy soil in cold frame in Aug. to Oct.; layering shoots in Sept.

SPECIES CULTIVATED. These have now been separated into three genera as follows: LITHOSPERMUM—*L. canescens*, yellow, July, 9 to 12 in., N. America; *Gastonii*, blue, summer, 1 ft., Pyrenees; *purpureo-caeruleum*, blue-purple, June to Aug., Europe. LITHODORA—*L. diffusa* (syn. *Lithospermum diffusum* and *prostratum*), blue, all summer, 6 in., Spain, Portugal; *oleifolia* (syn. *Lithospermum oleifolium*), sapphire-blue, May to June, 6 to 9 in., Pyrenees; *rosmarinifolia* (syn. *Litho-*

spermum rosmarinifolium), blue, winter, 12 in., slightly tender, Italy. **MOLTZIA**—*M. intermedia* (syn. *Lithospermum intermedium*), blue, summer, 9 to 12 in., hybrid; *petraea* (syn. *Lithospermum petraeum*), violet, June to July, 2 ft., half-evergreen bushy shrub, S.E. Europe; *suffruticosa* (syn. *Lithospermum graminifolium*), blue, June to Aug., 1 ft., Italy.

Littonia—*Liliaceae*. Greenhouse herbaceous perennial climber. First introduced mid-nineteenth century.

CULTURE: Compost, two parts loam, one part each of leaf-mould, peat and silver sand. Position, well-drained pots or bed in warm greenhouse. Pot or plant, March. Train shoots up roof or wall. Water freely during spring and summer, moderately autumn and winter. Syringe morning and evening during early period of growth. Plant likes plenty of sunshine. Temp., March to Sept. 65° to 75°, Sept. to March 50° to 60°.

PROPAGATION: By division of the plant at potting time.

SPECIES CULTIVATED: *L. modesta*, orange, April, 3 to 4 ft., S. Africa, and var. *Keitii*.

Liver Leaf, see *Hepatica*.

Living Stones, see *Lithops*, *Pleiospilos*.

Livistona—*Palmae*. Warm greenhouse palms. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part peat, little sand. Position, well-drained pots in warm greenhouse, Sept. to June; outdoors or in cool greenhouse in summer. Pot, Feb. or March. Water freely March to Sept., moderately afterwards. Syringe twice daily March to Oct., once Oct. to March. Temp., March to Sept. 60° to 70°, Sept. to March 55° to 60°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in rich light soil in temp. 80° to 90° in Feb. or March.

SPECIES CULTIVATED: *L. australis*, 40 to 50 ft., Australia; *chinensis*, 30 to 50 ft., leaves large, fan-shaped, China, Japan; *humilis*, 6 to 15 ft., Australia; *rotundifolia*, to 80 ft., Java.

Lizard's-tail, see *Saururus*.

Lloydia (Mountain Spider-wort)—*Liliaceae*. Hardy bulbous flowering plant.

CULTURE: Soil, sandy loam. Position, sunny, dryish borders or rockeries. Plant, Sept. or Oct. Depth for bulbs, 3 to 4 in. Lift and replant when unhealthy only.

PROPAGATION: By offsets, removed and planted in Sept. or Oct.

SPECIES CULTIVATED: *L. serotina*, white and green, June, 6 in., Britain (Snowdon).

Loasa—*Loasaceae*. Greenhouse and half-hardy annual climbing and twining plants. First introduced early nineteenth century.

OUTDOOR CULTURE: Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 65° in Feb. or March. Transplant seedlings singly in 3 in. pots when 1 in. high and grow in temp. 55° till June, then plant outdoors. Position, against sunny walls or fences. Soil, ordinary.

INDOOR CULTURE: Sow seeds as above. Transplant seedlings singly into 3 in. pots, and when 6 in. high into 5 in. size, or place three in an 8 in. size. Compost, two parts sandy loam, one part leaf-mould and sand. Train shoots round wire trellis or stakes inserted in the soil. Water moderately at first, freely afterwards. Apply stimulants occasionally to plants in bloom. Temp., 55° to 65°. All the species are furnished with stinging hairs and hence should not be touched by naked hands.

SPECIES CULTIVATED: *L. urens* (syn. *L. hispida*), yellow, to 1½ ft., Peru; *vulcanica*, white, yellow, and red, summer, 2 to 3 ft., Ecuador.

Lobelia—*Lobeliaceae*. Hardy and half-hardy herbaceous perennials. First introduced early seventeenth century.

OUTDOOR CULTURE OF HARDY SPECIES: Soil, ordinary rich. Position, sunny,

moist borders. Cool rock garden for *L. linnaeoides*. Plant, March or April. *L. Dortmanna* is an aquatic for very still, deep water such as lakes. On cold, damp soils all the species (except *L. siphilitica* and *linnaeoides*) best lifted in Oct., placed in pots, stored in cold frame till March, then replanted.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Pot, Oct. or March. Position, cold frame, Oct. to March; cool greenhouse, March, till past flowering, then outdoors. Water very little Oct. to March, freely afterwards. Apply stimulants, May to Aug.

CULTURE OF HALF-HARDY SPECIES: Soil, ordinary. Position, pots in greenhouse heated to temp. 55°, Oct. to June; as edgings to beds, etc., outdoors, June to Oct. Plant, June, 3 to 6 in. apart. Lift plants in Sept., place in small pots, and store in greenhouse to furnish cuttings in spring. Cut off flower stems a fortnight before lifting.

POT CULTURE: Compost, equal parts good soil, leaf-mould and sand. Position, dwarf kinds in 4 or 5 in. pots and trailing kinds in pots or baskets, in shady or sunny greenhouse or window. Pot, March to July. Water freely in summer, moderately other times. Apply stimulants to plants in flower.

PROPAGATION: Hardy perennial species by seeds sown $\frac{1}{4}$ in. deep in sandy loam and leaf-mould in cold frame in Sept. or Oct., or in temp. 55° in March; cuttings of shoots inserted in small pots in temp. 55° in spring; division in March. Half-hardy species by seeds sown in heat in Feb., transplanting seedlings 2 in. apart in boxes, hardening off in cold frame, and planting out in May; cuttings of young shoots inserted in sandy soil in temp. 65° to 75° in spring; division in March or April.

HARDY PERENNIAL SPECIES CULTIVATED: *L. cardinalis*, 'Cardinal Flower', scarlet, summer, 3 ft., N. America; *Dortmanna*, 'Water Lobelia', light blue, 9 to 12 in., Europe (Br.), N. America; *fulgens*, scarlet, May, 1 to 3 ft., Mexico; *Gerardii*, violet, July, 3 to 4 ft., hybrid; *laxiflora*, red and yellow, summer, 4 to 5 ft., Mexico; *splendens*, scarlet, 2 to 3 ft., N. America; *siphilitica*, blue, July, 2 to 3 ft., N. America; *Tupa*, red, Aug. to Sept., 4 to 6 ft., Chile. See also *Pratia*.

HALF-HARDY PERENNIAL SPECIES CULTIVATED: *L. Erinus*, blue and white, summer, 6 in., parent of bedding vars., S. Africa; *tenuior*, bright blue, Sept., 12 to 18 in., W. Australia. There are several named vars.

Loblolly Bay, see *Gordonia Lasianthus*.

Lobularia—*Cruciferae*. Perennial herbs and sub-shrubs differing from *Alyssum* in technical points and formerly included in that genus.

CULTURE: As *Alyssum*.

PROPAGATION: As *Alyssum*.

SPECIES CULTIVATED: *L. maritima* (syn. *Alyssum maritimum*), 'Sweet Alyssum', white, sometimes violet, fragrant flowers produced over a long season, to 12 in., perennial but grown as an annual, Medit. Region.

Lockhartia—*Orchidaceae*. An epiphytic genus. Stems tufted, clothed with small often glaucous, leaves. Flowers, solitary or few, small, from upper parts of stems, or terminals, often with large bracts.

CULTURE: Compost, two parts osmunda fibre, two parts sphagnum moss with crushed potsherds. Pans for the smaller growing, pots for the larger, well drained. A moist, warm atmosphere is needed, summer temp. 70° and upwards. Winter temp. around 60°, watering then not as frequent as in summer. Shading is required in summer.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *L. acuta* (syn. *Fernandezia acuta*), bright yellow, red marked, several, summer, Trinidad; *lunifera*, yellow, lip dotted red, variable, up to 15 in., summer, Brazil; *robusta*, golden yellow, lip red-spotted and streaked, summer, Costa Rica, Guatemala; *verrucosa* (syn. *Fernandezia robusta*), bright yellow, lip marked red, warted, summer, autumn, Guatemala.

Locust Tree, see *Robinia Pseudoacacia*

Loganberry, see *Rubus ursinus* var. *loganobaccus*.

Loiseleuria (Alpine Azalea)—*Ericaceae*. Hardy trailing evergreen flowering shrub.

CULTURE: Soil, deep, sandy peat. Position, open, moist rockeries. Plant, Sept. to Nov.

PROPAGATION: By layering shoots, Sept. to Nov.

SPECIES CULTIVATED: *L. procumbens* (syn. *Azalea procumbens*), rose to white, May, Subarctic Regions.

Lomaria, see *Blechnum*.

Lomatia—*Proteaceae*. Greenhouse evergreen shrubs. Orn. foliage. Leaves, feather- or egg-shaped, green or glaucous. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Position, well-drained pots in sunny, airy greenhouse, or sheltered borders in Cornwall and similar mild districts. Pot, Feb. to April. Prune into shape when necessary, Feb. Water moderately Sept. to April, freely afterwards. Ventilate freely April to Sept., moderately afterwards. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

PROPAGATION: By cuttings of firm shoots, 2 to 3 in. long, inserted in sandy peat under bell-glass in temp. 60° to 70°, June to Sept.

SPECIES CULTIVATED: *L. ferruginea* (syn. *L. pinnatifolia*), rosy red and white, 10 to 12 ft., Chile; *longifolia*, 8 to 10 ft., N.S. Wales; *obliqua*, white, to 20 ft., Chile; *silafolia*, white, May to June, 3 ft., Australia; *tinctoria*, 2 to 3 ft., Australia.

Lonas—*Compositae*. Hardy annual. Introduced late seventeenth century.

CULTURE: Soil, ordinary. Position, sunny borders.

PROPAGATION: By seeds sown outdoors in April where plants are required to grow.

SPECIES CULTIVATED: *L. inodora*, yellow, June to Aug., 1 ft., N.W. Africa.

London's Pride, see *Saxifraga umbrosa*.

Lonicera (Honeysuckle)—*Caprifoliaceae*. Hardy and slightly tender deciduous and evergreen shrubs, some twining, others of shrubby nature. Flowers most fragrant.

CULTURE OF TWINING SPECIES: Soil, rich ordinary. Position, as far as possible choose a shaded and cool position for the roots, but where the top growth can reach full sun. North-west or west walls are good, also the shaded side of pergolas or tree stumps. For the more tender evergreen kinds choose a partially shaded wall. Plant, Oct. or March. Mulch annually with compost or well-decayed manure. Any pruning necessary to restrict size should be done in early spring.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or well-decayed manure and sand. Pot, Oct. to Dec. Position, cold frame or greenhouse, Nov. to Feb.; warm greenhouse, Feb. to June; sunny place outdoors, June to Nov. Water freely Feb. to Oct., moderately afterwards. Apply stimulants occasionally when in flower. Prune previous year's shoots to within 1 or 2 in. of base in June.

CULTURE OF L. SEMPERVIRENS IN GREENHOUSE: Compost, same as for pot culture. Plant, Oct. to March. Position, small well-drained bed or tub, with shoots trained up rafter or trellis. Prune slightly after flowering. Water freely March to Sept., moderately afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

CULTURE OF SHRUBBY SPECIES: Soil, ordinary, well drained. Many are winter-and early spring-flowering, others subject to damage by spring frosts. Choose sheltered positions in shrubbery, sun or part shade. Plant, Oct., Nov. Pruning, thin out some of the older wood occasionally after flowering. *L. nitida*,

bushy, evergreen, suitable for hedges to 5 ft. high. Plant young specimens only up to 18 in. high, 18 in. apart, Oct. or April. Trim, June to July.

PROPAGATION: All kinds strike readily from July, Aug. cuttings in sandy soil in shaded frame; layering shoots, Aug. to Nov.; seeds, where available, in well-drained pots in temp. 55° to 60°, Feb. or March.

TWINING SPECIES CULTIVATED: *L. Brownii*, hybrid, semi-evergreen, vigorous to 15 ft., orange-scarlet, June to July, scentless; *Caprifolium*, 'Goat-leaf Honeysuckle', deciduous, creamy yellow tinged red, June, July, fragrant, Europe (Br.); *etrusca*, nearly evergreen, very vigorous, creamy yellow tinged red, July, very fragrant, tender in colder districts, Medit.; *Giraldii*, evergreen, vigorous, tender in colder districts, purplish-red, China; *Heckrotii*, hybrid, rather spreading habit, deep yellow and pink, June, July, hardy; *Henryi*, evergreen, vigorous, purplish-red, July, dark blue fruits, China; *Hildebrandtiana*, 'Giant Honeysuckle', tender, and only for extreme south and south-west gardens, and then requiring wall protection, flowers up to 6 in. long, cream fading to deep yellow, fragrant, Burma; *implexa*, 'Minorca Honeysuckle', 8 ft., semi-evergreen, rather tender, cream and white, June, July, S. Europe; *japonica*, vigorous and reliable small-leaved climber to 30 ft., very fragrant, June to Aug., Japan, more usually seen in one of its forms, *aureo-reticulata*, golden, variegated, and *Halliana*, flowers white and yellow, very fragrant all summer; *Periclymenum*, 'Wild Honeysuckle', 'Woodbine', and its improved garden forms, *belgica*, 'Early Dutch', and *serotina*, 'Late Dutch'; *sempervirens*, 'Trumpet Honeysuckle', vigorous, evergreen, only suited to mild parts of the country, orange and scarlet, summer, scentless, S.E. United States; *Tellmanniana*, hybrid, the most reliable of the trumpet-flowered types, deciduous, vigorous, pale orange tipped red, June, July, flowers large; *tragophylla*, hardy, deciduous, vigorous, large bright yellow flowers, June, July, China.

SHRUBBY SPECIES CULTIVATED: *L. alpigena*, yellow, tinged red, April to May, 6 ft., Europe; *angustifolia*, pinkish white, April to May, 8 to 10 ft., Himalaya; *chaetocarpa*, primrose yellow, June, 3 to 5 ft., Cent. China; *chrysantha*, yellowish-white, April, to 12 ft., N.E. Asia to Japan; *fragrantissima*, creamy white, Dec. to March, 6 to 8 ft., partially evergreen, China; *hispida*, yellow, May to June, 3 to 5 ft., Turkistan; *Ledebouri*, orange yellow and red, June, 8 to 9 ft., California; *Maackii*, white or yellow, May to June, to 10 ft., Manchuria and China; *Morrowii*, white to yellow, May to June, 6 to 8 ft., China and Japan; *nitida*, evergreen with neat foliage, 4 to 6 ft., W. China; *Purpusii*, vigorous hybrid, winter flowering, fragrant; *pyrenaica*, rose and white, May to June, 2 to 3 ft., Pyrenees; *Standishii*, creamy white, Nov. to March, 6 to 8 ft., partially evergreen, China; *syringantha*, lilac, May to June, to 8 ft., China and Tibet; *tatarica*, pink or white, May, 8 to 10 ft., Siberia, etc.; *quinquelocularis*, creamy white, June, 12 to 15 ft., Himalaya and China; *Xylosteum*, 'Fly Honeysuckle', yellow, May, 4 to 6 ft., Europe. All these bush honeysuckles have fragrant flowers and, frequently, attractive crops of red berries.

Loofah Gourd, see *Luffa*.

Loosestrife, see *Lysimachia*; **Purple-**, see *Lythrum Salicaria*.

Lopezia—*Onagraceae*. Half-hardy annual and perennial. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny borders.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light soil in temp. 55° to 65° in March, transplanting outdoors in May.

SPECIES CULTIVATED: *L. albiflora*, pinkish-white, late summer and autumn, 2 ft., Mexico, perennial, this may be grown in pots for flowering in the greenhouse; *coronata*, red, Aug., 1 ft., annual, Mexico.

Loquat, see *Eriobotrya japonica*.

Lord Anson's Pea, see *Lathyrus magellanicus*.

Lords and Ladies, see *Arum maculatum*.

Loropetalum—*Hamamelidaceae*. Slightly tender evergreen flowering shrubs, closely resembling the Wych-Hazel, but flowers white. First introduced late nineteenth century.

OUTDOOR CULTURE: Soil, ordinary, light rich. Position, warm, sheltered borders. Plant, Oct. to Feb. Prune to maintain good shape after flowering.

GREENHOUSE CULTURE: Compost, two parts sandy loam, one part leaf-mould and a liberal amount of sand. Position, pots in cold, sunny greenhouse; must not be forced. Water freely between March and Oct., moderately afterwards. Pot in Oct.; place outdoors in full sun from June to Oct. to ripen wood.

PROPAGATION: By cuttings in sandy soil in a cold frame in summer or autumn; by seeds in similar soil in a cold frame at any time.

SPECIES CULTIVATED: *L. chinense*, white, winter, 5 to 6 ft., China.

Lotus—*Leguminosae*. Greenhouse and hardy perennials.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts sandy loam, one part leaf-mould, half part each pounded charcoal and sand. Pot, Feb. or March. Position, pots in light, airy part of sunny greenhouse. Water moderately March to Sept., very little afterwards. Apply weak stimulants to healthy plants in flower. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

CULTURE OF HARDY SPECIES: Soil, ordinary rich. Position, sunny rockeries or elevated beds. Plant, March or April.

PROPAGATION: Greenhouse species by seeds sown $\frac{1}{8}$ in. deep in sandy soil in well-drained pot or pan in temp. 55° to 65° in March or April; cuttings of shoots inserted in well-drained pots of sandy soil under bell-glass in temp. 55° to 65° in summer. Hardy species by seeds sown $\frac{1}{8}$ in. deep in April where plants are required to grow; division of plants in March or April.

GREENHOUSE SPECIES CULTIVATED: *L. Berthelotii* (syn. *L. peliorhynchus*), scarlet, summer, 2 ft., Canaries.

HARDY SPECIES CULTIVATED: *L. aegaeus*, yellow, red-veined, summer, 1 to 2 ft., Balkan Peninsula; *corniculatus*, 'Bird's-foot Trefoil', yellow, summer, creeping, Britain, var. *pleniflorus*, double, yellow.

Lotus, see *Nymphaea* and *Nelumbo*; -**Tree**, see *Diospyros Lotus*.

Love Apple, see *Lycopersicon esculentum*; -**in-a-Mist**, see *Nigella damascena*; -**lies-bleeding**, see *Amaranthus caudatus*.

Luculia—*Rubiaceae*. Greenhouse evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous loam, peat, charcoal and sand. Position, in large well-drained pots, or preferably in beds 2 to 3 ft. wide and 18 in. deep. Put 6 in. of drainage into latter. Pot or plant, Feb., March or April. Prune young shoots moderately after flowering to a length of 2 or 3 in. Water freely April to Nov., withhold entirely afterwards. Syringe foliage twice daily April to Sept. Temp., April to Sept. 60° to 70°, Sept. to Dec. 55° to 65°, Dec. to April 45° to 55°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pans of light, sandy soil in temp. of 60° to 70° in Feb., March or April; cuttings of young shoots inserted in sandy soil under bell-glass in temp. 70° to 80° in June or July. Seedlings flower when three to five years old.

SPECIES CULTIVATED: *L. gratissima*, rose, autumn, 8 to 10 ft., Himalaya; *Pinceana*, rose, autumn, 10 ft., Himalaya.

Ludwigia—*Onagraceae*. Creeping aquatic plants used at pond margin and extensively for aquarium work. Glossy, privet-like leaves, insignificant yellow, axillary flowers.

CULTURE: Soil, sandy or plain loam. Position, submerged in aquarium or at pond margin. Plant, spring outdoors, any time in aquarium.

PROPAGATION: By seeds sown in pans of loam just covered with water in March or April; division or cuttings.

SPECIES CULTIVATED: *L. Mulertii*, most widely grown, foliage bronzed, not hardy, S. America; *palustris*, greener, Europe (Br.).

Luffa (Loofah; Dish-cloth Gourd)—*Cucurbitaceae*. Stove climbing annual, bearing curious gourd-like fruits.

CULTURE: Sow seeds in a compost of equal parts leaf-mould and loam in a temp. of 75° in Feb. Transfer seedlings when third leaf forms singly into 3 in. pots, and later on to 8 or 10 in. pots, using three parts of loam to one of leaf-mould. Train shoots up roof. Water freely. Syringe daily. Feed with weak liquid manure when fruit has formed.

SPECIES CULTIVATED: *L. acutangula*, yellow, summer, India, Malaya; *cylindrica* (syn. *L. aegyptiaca*), yellow, summer, fruits club-shaped, Tropics. There are numerous garden forms.

Luisia—*Orchidaceae*. An epiphytic genus, allied to but not comparable, in floral beauty, with Vanda. The tufted stems and leaves terete. Flowers few, almost sessile.

CULTURE: Compost and temp. as for Vanda. Winter waterings should be infrequent, when falls of temp. to 55° would do no harm.

PROPAGATION: By severance of the stem below roots or division of plants.

SPECIES CULTIVATED: *L. Amesiana*, yellow, brownish, lip spotted maroon, summer, Burma, India; *brachystachys*, greenish rose-purple and yellow, summer, autumn, Burma; *Psyche*, greenish-yellow, lip reticulated violet-purple, summer, 12 in., Burma; *teretifolia*, variable, dull purplish-brown, sometimes whitish, widely distributed in the East; *trichorhiza*, green, brown, lip purplish-brown, various, N. India.

Lunaria—*Cruciferae*. Annual and perennial flowering plants. Seed pods flat, oval, containing a satiny partition; very useful for drying for winter decorations. First introduced late sixteenth century.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, partially shaded borders or margins of shrubberies. Plant, Aug. to Oct., singly or in groups of three or six. Discard plants after flowering.

CULTURE OF PERENNIAL SPECIES: Soil, light, rich ordinary. Position, partially shaded borders. Plant, Oct., March or April.

PROPAGATION: Annual species by seeds sown in shallow drills or patches outdoors in sunny position in April, transplanting seedlings when third leaf is formed 6 in. apart each way; perennial species by seeds similarly, or by division of roots in March or April.

ANNUAL SPECIES CULTIVATED: *L. annua* (syn. *L. biennis*), 'Honesty', 'Money Flower', 'Satin Flower', lilac, white, or purple, May and June, 2 to 3 ft., Europe.

PERENNIAL SPECIES CULTIVATED: *L. rediviva*, purple, fragrant, June, 2 to 3 ft., Europe.

Lungwort, see *Pulmonaria*.

Lupin, Lupine, see *Lupinus*.

Lupinus (Lupin)—*Leguminosae*. Hardy shrubby and herbaceous perennials and annuals. First introduced late sixteenth century.

CULTURE OF SHRUBBY PERENNIALS: Soil, sandy loam. Position, sunny shrubberies, or open, sheltered borders. Plant, Oct. or April. Prune into shape after flowering.

CULTURE OF HERBACEOUS PERENNIALS: Soil, ordinary rich. Position, open sunny or partially shaded borders. Plant, Oct., March or April. Mulch with decayed manure in April. Cut down flower stems in Oct. Dislikes lime.

CULTURE OF ANNUAL SPECIES: Sow seeds $\frac{1}{8}$ in. deep and 1 in. apart in April in patches where required to flower. Thin seedlings in May to 6 to 12 in. apart. Remove seed pods directly they form to ensure continuous display of flowers. Apply stimulants when in flower. Water freely in dry weather.

PROPAGATION: Perennial species by seeds sown $\frac{1}{8}$ in. deep outdoors in April,

transplanting seedlings into flowering positions June to Aug.; cuttings of young growth taken in March before they become hollow, and rooted in sandy soil in unheated frame.

SHRUBBY SPECIES CULTIVATED: *L. arboreus*, 'Tree Lupin', yellow, fragrant, summer, 6 to 9 ft., and var. *albus*, white; *Paynei*, blue, pink, or white with yellow blotch, spring, to 8 ft., California.

HERBACEOUS SPECIES CULTIVATED: *L. nootkatensis*, blue, purple, and yellow, summer, 1 ft., N. America; *polyphyllus*, 'Perennial Lupin', blue, summer, 3 to 6 ft., California, and vars. *albus*, white, *roseus*, pink. There are also many named vars. to be found in trade lists.

ANNUAL SPECIES CULTIVATED: *L. densiflorus* (syn. *L. Menziesii*), yellow, fragrant, Aug., 2 ft., California; *Hartwegii*, blue, white, and rose, Aug. to Sept., 2 to 3 ft., Mexico; *hirsutissimus*, reddish-purple, July, 9 in., California; *hirsutus*, blue and white, July to Aug., 1½ to 2½ ft., Medit. Region; *luteus*, yellow, June to Aug., 1 to 2 ft., S. Europe; *mutabilis*, white, blue, and yellow, fragrant, summer, 3 to 4 ft., Colombia, and var. *Cruckshanksii*, violet and purple; *nanus*, lilac and blue, summer, 1 ft., California; *pubescens*, violet blue and white, July to Sept., 1½ to 3 ft., Mexico and Guatemala, and vars. *albococcineus*, *atrococcineus*, *Dunnettii*, *elegans*, *speciosus*, *superbus*, *tricolor*, etc.; *subcarnosus*, blue and yellow, summer, 1 ft., Texas.

Luronium (Floating Water Plantain)—*Alismaceae*. Dainty aquatic for shallow water, pond edges or submerged in aquarium.

CULTURE: Soil, indifferent. Plant, spring.

PROPAGATION: Division.

SPECIES CULTIVATED: *L. natans* (syn. *Elisma natans*), 1 to 2 in., white flowers, tiny leaves, Europe.

Luzula—*Juncaceae*. Ornamental hardy grass-like plants.

CULTURE: Any reasonable soil. Position, in sun or semi-shade, on dryish banks or by stream-side.

PROPAGATION: By seeds; division of old plants in spring or autumn.

SPECIES CULTIVATED: *L. maxima*, ornamental grass-like tufts, 1 to 2 ft., Europe; *nivea*, flower heads creamy-white, summer, 2 in., Europe.

Lycaste—*Orchidaceae*. A terrestrial and epiphytic genus (often on rocks), not large but of great importance. The majority have beautiful flowers. All are of easy cultivation. Stout, ovoid pseudo-bulbs, scapes single-flowered, freely produced from their base. Leaves plicate, deciduous in some species, nearly so in others.

CULTURE: Compost, fibrous loam, with a little sphagnum moss and finely pounded potsherds. Peat may be added; if in quantity, use more potsherds. Pots with free drainage. Repot, if necessary, in spring. As with all plicate-leaved orchids, the syringe should not be used until the leaves are fully expanded. Light shading in summer. Whenever weather allows, admit air at night, in reason, by top vents. The plants should mature in autumn and then be exposed to full light. A decided rest should be given in winter, especially to deciduous. Winter night temp. 50°. If dry they will withstand lower, but at 50° a slight humidity can be maintained. Summer temp. 60°, or near, at night, with sun heat higher in the day. Avoid draughts but air freely without losing humidity. When growths first commence, water infrequently but thoroughly, freely in summer.

PROPAGATION: By division of plants when repotting, or by sound back bulbs, removed singly, placed in a small pot, filled with small potsherds and surfaced with sphagnum. Pot when roots are seen.

SPECIES CULTIVATED: A selection—*L. aromatica* (syn. *Maxillaria aromatica*), orange-yellow, rather small, very fragrant, winter, spring, Mexico, and var. *majus*, larger, often with reddish stain at lip base; *brevispatha*, very variable, pale green, whitish, spotted, flushed rose, lip white, spotted rose-purple, winter, spring, summer, Costa Rica, Guatemala, and var. *Lawrenceana* (syn. *L. Lawrenceana*), heavily spotted and flushed with rose, variable; *costata* (Lindl), large, ivory white, lip margins fimbriate, summer, Peru; *cruenta* (syn. *L. Maxillaria*), larger than

aromatica, orange-yellow, with a sanguineous blotch at base of lip, sometimes fragrant, spring, summer, Guatemala; *Deppei* (syn. *L. Maxillaria*), green, red-spotted, white, lip yellow, winter, spring, Mexico; *Dyeriana*, plant and flowers pendent, green, lip fringed, summer, Peru; *fulvescens*, large, yellowish-brown, lip orange-brown, fringed, summer, various, Colombia; *gigantea*, large, olive green, lip chocolate, orange-yellow, margins denticulate, summer, various, Ecuador; *lanipes*, greenish-white, ivory white, lip margins shortly fimbriate, autumn, Brazil, Peru, Ecuador; *lasioglossa*, sepals red-brown, petals yellow, mid-lobe of lip woolly haired, winter, spring, Guatemala; *leucantha*, greenish, creamy white, variable, various, Costa Rica; *locusta*, green, lip margin with short white hairs, spring, summer, Peru; *longiscapa*, green, scapes 2 ft. high, spring, various, rare; *Luscianii*, a natural hybrid, spring, Guatemala; *macrobulbon*, much larger than *L. cruenta*, yellow to orange-yellow, tinged green, spring, summer, Colombia; *macrophylla* (syn. *L. plana*), greenish, shaded red, petals white, rose spotted, lip white crimson-spotted, variable, spring, various, Brazil, Peru; *Skinneri* (syn. *Maxillaria Skinneri*), variable, very beautiful, large, sepals whitish, rose-flushed, petals rose, lip flushed rose to purple, the vars. are endless, colour from pure white to crimson, winter, spring, Guatemala.

Lychnis (Campion)—*Caryophyllaceae*. Hardy annuals and perennials. By some authors certain species are placed in separate genera: *Melandrium*, *Viscaria* and *Agrostemma*.

CULTURE OF PERENNIAL SPECIES: Soil, light rich loam for *L. alpina*; open, dryish beds, borders or banks for other species. Plant, Oct. and Feb. to May. Cut down flower stems of *L. chalcedonica* and *L. alba* in Oct. or Nov. Top-dress border species with well-decayed manure in March or April. Apply weak liquid manure occasionally to border species when in flower. Lift and replant border species every other year.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny beds or edgings to or masses in borders. Sow in March or April for summer, Sept. for spring flowering.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in sunny position outdoors in March or April, transplanting seedlings into flowering position Aug. to Nov.; division of perennials, Sept. to Dec. and Feb. to April.

PERENNIAL SPECIES CULTIVATED: *L. alba* (syns. *L. vespertina*, *Melandrium album*), 'White Champion', white, May to Aug., 3 ft., Britain; *alpina* (syn. *Viscaria alpina*), rosy pink, summer, 6 in., Europe (Br.); *Arkwrightii*, scarlet, summer, 1½ ft., hybrid; *chalcedonica*, 'Scarlet Lychnis' or 'Jerusalem Cross', scarlet, summer, 3 ft., Russia, and vars. *alba*, white, and *flore-pleno*, double; *Coronaria* (syn. *Agrostemma Coronaria*), 'Rose Champion', crimson, July and Aug., 2 to 3 ft., S. Europe, and vars. *atrosanguinea*, crimson red, *alba*, white, and *flore-pleno*, red; *dioica* (syns. *Melandrium dioicum*, *rubrum* and *sylvestre*), 'Red Champion', purple, rose, summer, 3 ft., Britain; *Flos-cuculi* (syn. *A. Flos-cuculi*), 'Ragged Robin', rose, May and June, 1 to 2 ft., Britain, and double var. *flore-pleno*; *Flos-Jovis* (syn. *A. Flos-Jovis*), bright pink, summer, 1½ to 2 ft., Europe; *fulgens*, vermillion, May to Sept., 6 to 12 in., Siberia; *Haageana*, scarlet, summer, 9 to 12 in., hybrid; *Viscaria* (syn. *V. viscosa*), 'German Catchfly', reddish-purple, summer, 1 ft., Europe (Br.), and vars. *splendens*, red, *alba*, white, *flore-pleno*, rose, double.

ANNUAL SPECIES CULTIVATED: *L. Coeli-rosa* (syn. *Agrostemma Coeli-rosa*), 'Rose of Heaven', rose and purple, summer, 1 ft., Levant, and vars. *alba*, white, *kermesina*, red, and *oculata*, purple-eyed.

Lycium (Box-thorn)—*Solanaceae*. Hardy erect and climbing deciduous flowering shrubs with branches more or less spiny. First introduced late seventeenth century.

CULTURE Soil, ordinary. Position, not worthy of place of importance, but useful for dry poor soil, and especially seaside cliffs, quite attractive when berrying well. Plant, Oct. to Feb. Prune, Oct. to Feb., removing weak shoots entirely and shortening vigorous ones a little.

HEDGE CULTURE: Trench ground two spits deep and 3 ft. wide. Plant 12 in. apart in single rows, Oct. to Feb. Trim into shape, June and July.

PROPAGATION: By cuttings of firm shoots, 6 to 8 in. long, inserted in ordinary soil in shady position in Sept. or Oct.; layering shoots, spring; by removing suckers with roots attached, Oct. to Feb.

SPECIES CULTIVATED: *chinense*, 'Common Box-thorn', 'Duke of Argyll's Tea-tree', purple and yellow, summer, 10 to 12 ft., succeeded by scarlet berries, China; *L. halimifolium*, lilac-purple, May to July, 8 to 9 ft., S.E. Europe and W. Asia; *pallidum*, green and purple, June to July, 5 to 6 ft., South-eastern U.S.A.

Lycopersicon (Tomato)—*Solanaceae*. Tender perennials treated as half-hardy annuals.

CULTURE OUTDOORS: Set out plants, in early June, in the open. Plant 18 in. apart with separate stakes, remove all side shoots and stop when four trusses formed. Bush vars. may grow freely, planted 3 ft. apart. Water freely and feed weekly with tomato fertiliser after first fruits set. Gather remaining fruit in late Sept. and ripen indoors.

CULTURE IN FRAMES AND CLOCHES: Set out plants first week in May, choosing short-jointed vars. Either train them horizontally along stakes or remove protection when plants grow.

CULTURE IN HEATED HOUSES: May be grown in borders, troughs, boxes or pots. Compost, five parts good turfy loam, one part well-decayed stable manure to which is added 1 lb. each of lime, hoof and horn, sulphate of potash and bonemeal per bushel. Plant when 3½ in. pot well supplied with roots about 10 weeks after sowing. Stake or tie to strings. Water in and keep soil moist; when fruit is set, two heavy waterings daily may be needed. Temp. at planting should be 60° at night and 65° to 70° by day. Set fruit by damping overhead in the mid-morning from time first flowers open. Feed with tomato fertiliser weekly after fruits set. Ventilate during day when day temp. reaches 65° and at night when temp. reaches this level.

PROPAGATION: Any time when night temp. of 60° can be maintained, avoiding short dull days of November and December. Sow in sterilised compost, water and cover boxes with glass and paper. Germination, 8 days. Keep house moist and when 2 in. high pot into 3½ in. pots. Keep well watered and space out plants as they grow. 1 oz. of seed will yield about 2,000 plants.

SPECIES CULTIVATED: *L. esculentum*, 'Tomato', fruits red or yellow, Western S. America, and vars. *cerasiforme*, 'Cherry Tomato', *pyriforme*, 'Pear Tomato'; *pimpinellifolium*, 'Currant Tomato', trusses of very small fruits. Used in crosses with other species to produce heavy cropping, dwarf and leaf-mould resistant vars.

Lycopodium—*Lycopodiaceae*. Stove and hardy perennial mosses, creeping or erect, closely allied to ferns. Foliage, ornamental. Stems clothed with scale-like, dark green leaves.

CULTURE OF STOVE SPECIES: Compost, equal parts loam, peat, limestone and silver sand. Position, well-drained shallow pans under bell-glass or in beds in wardian cases and are especially suitable for teakwood baskets. Pot or plant, Feb. to April. Water freely March to Sept., moderately afterwards. Syringe once or twice daily April to Sept. Shade from direct sun. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

CULTURE OF HARDY SPECIES: Soil, deep, moist, sandy peat. Position, low bed on moist rockery in shade. Plant, March or April. Water freely in dry weather. In wardian cases: compost, two parts peat, one part leaf-mould, one part charcoal and liberal quantity of limestone chips or tufa, bed to be well drained. Plant, Feb. to April. Water once or twice a week, April to Sept., fortnightly Sept. to Dec. and once a month Dec. to April. Syringe or dew over daily April to Oct. Shade from sun. Ventilate a little daily.

PROPAGATION: By division, Feb. to April.

STOVE SPECIES CULTIVATED: *L. squarrosum*, 2 ft. or more, India; *taxifolium* W. Indies; *verticillatum*, Tropics.

HARDY SPECIES CULTIVATED: *L. Billardieri*, free-growing creeper, New Zealand; *clavatum*, 'Club Moss', 'Stag's-horn Moss', creeping, Britain; *complanatum*, fan-like growth, N. America; *lucidulum*, grows erect to 6 to 8 in., glossy green, N. America; *Selago*, 'Fir Club Moss', 3 in., Britain; *tristachyum*, creeping, Europe.

Lycoris—*Amaryllidaceae*. Greenhouse flowering bulbs. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part equal proportions of leaf-mould and cow manure. Pot dry bulbs Sept. to Dec., afterwards repotting annually immediately after flowering. Bury bulbs about two-thirds of their depth. Water moderately from time flowers show till leaves appear, then freely; keep quite dry after leaves fade. Temp., Sept. to April 55° to 65°. Place pots from April to Sept. in light, sunny, cool position.

PROPAGATION: By offsets, treated as bulbs, Sept. to Dec.

SPECIES CULTIVATED: *L. aurea* (syn. *Amaryllis aurea*), 'Golden Lily', yellow, Aug., 1 to 2 ft., China; *radiata* (syn. *Nerine japonica* and *Amaryllis radiata*), scarlet, June, 18 in., China and Japan, and vars. *alba*, white, and *variegata*, crimson and white; *sanguinea*, crimson, summer, 2 ft., Japan; *squamigera*, rosy lilac, fragrant, summer, 2 ft., Japan.

Lygodium (Climbing Fern)—*Schizaeaceae*. Stove and greenhouse climbing ferns, deciduous and evergreen. Fronds slender, twining, divisions lingulate or palmate. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, loam, sand and charcoal. Position, well-drained pots or beds in shade with fronds twined round sticks, pillars, string or trellis. Plant or pot, Feb. to April. Water freely Feb. to Oct., moderately afterwards. Temp. stove species, Sept. to March 55° to 65°, March to Sept. 65° to 75°; greenhouse, Sept. to March 45° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By spores sown on surface of fine sandy peat under bell-glass in temp. 75° to 85° any time; division of plants at potting time.

STOVE SPECIES CULTIVATED: *L. circinatum* (syn. *L. dichotomum*), Trop. Asia; *reticulatum*, Polynesia.

GREENHOUSE SPECIES CULTIVATED: *L. japonicum*, E. Asia; *palmatum*, U. States; *scandens*, the most generally grown species, E. Asia.

Lyonia—*Ericaceae*. Hardy deciduous flowering shrub of no great garden merit. First introduced mid-eighteenth century.

CULTURE: Soil, peaty. Position, moist, shady borders. Plant, Sept. to Nov. and Feb. to April. Pruning unnecessary.

PROPAGATION: By seeds sown on surface of sandy peat under bell-glass in shade in cold frame or greenhouse in Oct. or April; layering shoots, Sept. or Oct.

SPECIES CULTIVATED: *L. ligustrina*, white, June, 4 to 8 ft., N. America. See also *Leucothoe*.

Lyre Flower, see *Dicentra spectabilis*.

Lysimachia (Loosestrife)—*Primulaceae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary rich. Position, moist shady borders or margins of ponds, etc. Plant, Oct. to April. Cut down flower stems of tall kinds in Nov.

CULTURE OF CREEPING JENNY IN POTS: Compost, two parts good soil or loam, one part leaf-mould, decayed manure or compost and one part sand. Position, well-drained pots or baskets suspended in shady window or cool greenhouse. Pot, March to May. Water freely April to Sept., moderately afterwards.

PROPAGATION: By division of plants in spring or autumn.

SPECIES CULTIVATED: *L. atropurpurea*, red, summer, to 2 ft., Greece; *clethroides*, white, July to Sept., 3 ft., China, Japan; *Ephemerum*, white, summer, 3 ft., Medit. Region; *Fortunei*, white, summer, 1½ ft., China, Japan; *Nummularia*, 'Creeping Jenny', 'Moneywort', yellow, summer, creeping, Britain; *phyllocephala*, yellow, summer, 1 ft., China; *punctata* (syn. *L. verticillata*), yellow, summer, 2 to 3 ft., Britain; *thyrsiflora*, yellow, June to July, 3 ft., Britain, Asia, N. America; *vulgaris*, 'Yellow Loosestrife', yellow, July to Aug., 3 ft., Britain, Europe, Asia.

Lysionotus—*Gesneriaceae*. Dwarf evergreen shrub.

CULTURE: Soil, deep, cool, lime-free, composed principally of peat or well-rotted leaf-mould. Position, cool, semi-shaded aspect or alpine house.

PROPAGATION: By cuttings made of half-ripened growths in late summer.

SPECIES CULTIVATED: *L. pauciflorus*, white and lavender, late summer, 6 to 9 in., Japan.

Lythrum (Loosestrife)—*Lythraceae*. Hardy herbaceous and shrubby perennials.

CULTURE: Soil, ordinary. Position, moist shady borders or margins of ponds or streams. Plant, Oct. or Feb. to April. Cut down flower stems in Nov. Water freely in dry weather. Top-dress with well-decayed manure, March or April. Lift, divide, and replant every third year.

PROPAGATION: By division of plants, Oct. or April.

SPECIES CULTIVATED: *L. alatum*, purple, July to Oct., 2 to 4 ft., N. America; *Salicaria*, 'Purple Loosestrife', reddish-purple, July, 3 to 4 ft., Britain, and vars. *roseum*, *superbum* and *tomentosum*; *virgatum*, purple, summer, 3 ft., Europe.

Maackia—*Leguminosae*. Hardy deciduous flowering tree of little garden merit. First introduced mid-nineteenth century.

CULTURE: Soil, loamy. Position, sunny shrubberies. Plant, Nov. to Feb.

PROPAGATION: By seeds sown in well-drained pans in temp. 55° to 60° during Feb. or March; cuttings of roots placed in pans in similar temp. and at same season.

SPECIES CULTIVATED: *M. amurensis* (syn. *Cladrastis amurensis*), white, July to Aug., 15 to 40 ft., Manchuria and Japan.

Mace, see *Myristica*; **Reed**-, see *Typha latifolia*.

Mackaya—*Acanthaceae*. Greenhouse deciduous flowering shrub. First introduced mid-nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part dried cow manure, half-part sharp silver sand. Position, light airy greenhouse. Pot, March. Prune after flowering, shortening shoots to 2 or 3 in. Water freely March to Sept., moderately Sept. to Nov., keep quite dry Nov. to March. Temp., April to Oct. 55° to 65°, Oct. to April 45° to 55°.

PROPAGATION: By cuttings inserted singly in 2 in. pots filled with sandy soil, June to Aug. Transfer to 5 in. pots when rooted. Prune closely in April and shift into 8 and 10 in. pots. Plants flower when two to three years old.

SPECIES CULTIVATED: *M. bella* (syn. *Asystasia bella*), lilac, veined purple, April to June, 4 to 6 ft., Natal.

Macleania—*Ericaceae*. Greenhouse trailing evergreen flowering shrubs. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts turfy loam, peat and sand. Position, well-drained pots with shoots drooping over front of staging, or in suspended baskets. Pot, March or April. Water freely March to Sept., moderately afterwards. Prune straggling shoots into shape, March. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

PROPAGATION: By cuttings inserted in fine sand in temp. 55° to 65° in summer.

SPECIES CULTIVATED: *M. pulchra*, yellow and scarlet, spring, 8 to 10 ft., Colombia; *punctata*, rosy red, white, and yellow, November, Ecuador; *speciosissima*, yellow and scarlet, spring, trailing, Colombia.

Macleaya—*Papaveraceae*. Hardy herbaceous perennials. Sometimes included in the genus *Bocconia*. First introduced late eighteenth century.

CULTURE: Soil, rich loamy, well manured. Position, open, sunny, sheltered from cold winds. Plant, April. Cut down flower stems after blooming. Good plant for pot culture in cool greenhouse or window. Compost, two parts loam, one part leaf-mould and sand. Pot, March. Water freely spring and summer, moderately other times.

PROPAGATION: By cuttings of young shoots growing out of axils of leaves, inserted

in small pots of sandy soil, temp. 55° under bell-glass, June to Aug.; by suckers removed from root, placed in pots in cold frame in July; by root cuttings in winter.

SPECIES CULTIVATED: *M. cordata* (syn. *Bocconia cordata*), 'Plume Poppy', 'Tree Celandine', buff or whitish, July, 6 to 8 ft., China; *microcarpa* (syn. *Bocconia microcarpa*), yellowish buff, June, 6 to 7 ft., N. China.

Maclura—*Moraceae*. Hardy deciduous spiny tree. Flowers, yellowish green, inconspicuous. Sexes borne on separate trees. Fruit, round, golden yellow, 3 to 5 in. in diameter; rarely borne in this country. Leaves, egg-shaped, bright green. Wood used for longbows. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, in open, sheltered shrubberies or hedges. Plant, Oct. to Feb. Prune into shape when necessary, Nov. to Feb.

HEDGE CULTURE: Plant 12 in. apart in single row. Soil to be trenched two spits deep and 3 ft. wide. Trim into shape, July and Nov.

PROPAGATION: By cuttings, 6 to 8 in. long, inserted in ordinary soil in shady position, Oct. to March.

SPECIES CULTIVATED: *M. pomifera* (syn. *M. aurantiaca*), 'Osage Orange', 20 to 40 ft., N. America.

Macradenia—*Orchidaceae*. An epiphytic genus of dwarf habit, pseudo-bulbs small, the usually pendulous inflorescence from their bases.

CULTURE: Compost and general conditions as for *Oncidiums*, pans or small baskets are suitable. Position near the glass but careful shading is necessary. The winter rest must not be severe, but watering should be far less frequent than in summer. The *Cattleya* house gives the requisite temp.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: *M. lutescens*, yellowish-green, marked with red-brown on inner surfaces, summer, autumn, Florida, W. Indies; *modesta* (syn. *Serastylis modesta*), red-brown, margined yellow, lip whitish, purple streaked, spring, summer, Brazil; *triandra*, greenish, purplish-red, lip yellowish, purple streaked, spring, summer, Surinam, Guiana.

Macrozamia—*Cycadaceae*. Greenhouse evergreen perennials with feather-shaped, green leaves. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, loam and sand. Position, well-drained pots, in light greenhouse, shaded from sun. Pot, Feb. or March. Water freely April to Oct., moderately afterwards. Syringe daily April to Sept. Temp., March to Sept. 60° to 70° , Sept. to March 55° to 60° .

PROPAGATION: By seeds sown in sandy peat in temp. 75° in March; division of plants in March; offsets in Feb. or March.

SPECIES CULTIVATED: *M. Fraseri*, 'Swan River Fern Palm', W. Australia; *Hopei*, Australia; *Peroffskyana*, 'Giant Fern Palm', Australia; *tenuifolia*, Australia.

Madagascar Jasmine, see *Stephanotis floribunda*; **-Lace Plant**, see *Aponogeton fenestralis*; **-Periwinkle**, see *Vinca rosea*.

Madeira Vine, see *Boussingaultia baselloides*.

Madia—*Compositae*. Hardy annuals. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, shady borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in April in patches where required to flower, thinning out seedlings when 2 in. high, to 3 in. apart.

SPECIES CULTIVATED: *M. elegans*, yellow, Aug., 1 ft., N.W. America; *sativa*, yellow, Aug., 1 ft., Chile.

Madwort, see *Alyssum*.

Magnolia—*Magnoliaceae*. Hardy deciduous and evergreen flowering trees and shrubs. Contrary to popular belief there are many kinds of easy culture suitable for small gardens, which flower when quite small. First introduced seventeenth century.

GREENHOUSE CULTURE: Compost, two parts sandy loam, one part peat or leaf-

mould and sand. Position, well-drained pots or tubs, or against walls in sunny greenhouse. Pot or plant, March. Water freely in summer, moderately other times. Syringe daily March to Sept. Temp. for forcing, 55° to 65°. Prune straggling shoots into shape, March or April. *M. Campbellii*, *Soulangeana* and *stellata* are suitable for greenhouse culture.

CULTURE: Soil, rich, deep, sandy loam, mulch annually with peaty compost until established. Position, sheltered parts of lawn or pleasure garden, or against south or south-west walls, evergreen kinds against south or west walls. Plant, March or April. When necessary prune evergreen species in spring, deciduous species after flowering. Protect evergreen species in very severe weather.

PROPAGATION: By seeds in well-drained sandy soil in cold frame or greenhouse in spring or autumn; layering in summer or autumn; grafting in heat in July or Aug.

SPECIES CULTIVATED: *M. acuminata*, 'Cucumber Tree', greenish-yellow, red fruits, quick growing, 60 to 90 ft., Eastern N. America; *Campbellii*, clear rose-pink 8 in. flowers in March, vigorous but slow to flower, to over 100 ft., Himalaya; *denudata* (syn. *M. conspicua*), 'Yulan', white, March to May, fragrant, 30 ft., China; *Kobus*, white, April, quick growing, 30 to 60 ft., Japan; *mollicomata*, pink, spring, flowers when young, large tree, Himalaya; *obovata* (syn. *M. hypoleuca*), 8 in. creamy white, fragrant, June, to 50 ft., Japan; *salicifolia*, white, April, distinct narrow foliage, 15 to 20 ft., Japan; *Sieboldii* (syn. *M. parviflora*), waxy-white with crimson centre, fragrant, May to August, flowering when young, easily grown, Japan and Korea; *sinensis*, white, crimson centre, fragrant, summer, to 20 ft., W. China; *Soulangeana*, white, purple stained without, flowering when young, easily grown, spreading, hybrid, to 20 ft., and vars. *alba*, white, *Lennei*, rosy purple, *nigra*, white stained deep wine, slow growing, easy for small gardens; *stellata*, white fading pink, March, April, very free flowering when young, slow growing to 15 ft., Japan; *tripetala*, 'Umbrella Tree', creamy white, May to June, large leaves, 30 ft., Eastern N. America; *Watsonii*, large, white, crimson centre, very fragrant, May to July, Japanese hybrid; *Wilsonii*, white, crimson centre, June to July, 20 ft., W. China; *virginiana* (syn. *M. glauca*), 'Swamp Bay', 'Beaver Tree', white, July to Aug., shrub to 15 ft., Eastern U.S.A.

EVERGREEN SPECIES CULTIVATED: *M. Delavayi*, creamy white, June, requires wall protection, 20 to 30 ft., S.W. China; *grandiflora*, white, fragrant, July to Aug., freely planted evergreen, slow in flowering, 15 to 20 ft., South U.S.A.

× **Mahoberberis**—*Berberidaceae*. A bigeneric hybrid between *Mahonia Aquifolium* and *Berberis vulgaris*. Sub-evergreen shrub of little ornamental value, not known to bloom.

CULTURE: As *Berberis*.

PROPAGATION: Vegetative.

SPECIES CULTIVATED: *M. Neubertii* (syn. *Berberis Neubertii*), nearly evergreen, to 6 ft., and var. *latifolia*, broader leaves.

Mahogany, see *Swietenia*.

Mahonia—*Berberidaceae*. Hardy evergreen shrubs. Formerly included in the genus *Berberis*.

CULTURE: Soil, good garden. Position, excellent as ground cover, has attractive and durable foliage.

PROPAGATION: By seeds, suckers, layers and cuttings of half-ripe wood under glass.

SPECIES CULTIVATED: *M. Aquifolium* (syn. *Berberis Aquifolium*), yellow, spring, winter coloured leaves useful for cutting, useful for banks, to 3 ft., West N. America; *Bealei* (syn. *Berberis Bealei*, *Mahonia japonica*), yellow, blue berries, to 12 ft., China; *lomariifolia*, yellow, 1 to 2 ft., China; *napaulensis*, to 10 ft., Himalaya; *pinnata* (syn. *M. fascicularis*), like a taller *M. Aquifolium*, sea-green foliage, to 12 ft., Western N. America.

Maianthemum—*Liliaceae*. Hardy herbaceous perennial. Leaves and habit similar to the Lily of the Valley.

CULTURE: Soil, ordinary rich. Position, shady borders in the open or under shrubs. Plant, Sept. and Oct. Water freely in dry weather.

PROPAGATION: By division of creeping rootstocks in Sept. or April.

SPECIES CULTIVATED: *M. bifolium* (syn. *M. Convallaria*, *Smilacina bifolia*), white, May, 6 in., N. Europe.

Maiden's Wreath, see *Francoa*.

Maid-of-the-Mist, see *Gladiolus primulinus*.

Maidenhair Fern, see *Adiantum*; **-Spleenwort**, see *Asplenium Trichomanes*; **-Tree**, see *Ginkgo biloba*.

Maize, see *Zea Mays*.

Majorana (Marjoram)—*Labiatae*. Perennial herbs and sub-shrubs with aromatic foliage.

CULTURE OF SWEET MARJORAM: Soil, ordinary, rich. Position, sunny border. Gather shoots when coming into flower, dry in shade and store for winter use.

CULTURE OF POT OR COMMON MARJORAM: Soil, ordinary. Position, sunny.

PROPAGATION: Sweet Marjoram: Sow seeds $\frac{1}{16}$ in. deep in light soil in shallow boxes in temp. 55° to 65° in March, transplanting seedlings when 2 in. high to 6 in. apart in rows 9 in. apart in April outdoors. Common or Pot Marjoram: By seed in sunny position outdoors in March or April; division of roots March or April.

SPECIES CULTIVATED: *M. hortensis* (syn. *Origanum Majorana*), 'Sweet Marjoram', purple or white, summer, to 2 ft., Europe; *Onites*, 'Common' or 'Pot Marjoram', white, summer, 1 ft., S.E. Europe.

Malay Apple, see *Eugenia malaccensis*.

Malcomia—*Cruciferae*. Hardy annual. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, edging to sunny beds, masses on sunny borders, or on banks or rockeries. Sow seeds for summer flowering $\frac{1}{16}$ in. deep in March, April, May or June where plants are required to grow, and similar depth in Sept. for flowering in spring.

POT CULTURE: Compost, any good soil. Position, in 5 in. pots, well drained, in cold, sunny greenhouse or window. Sow seeds $\frac{1}{16}$ in. deep in above pots in March, April or May. Water moderately when first sown, freely when in full growth. Thin seedlings to $\frac{1}{2}$ in. apart when 1 in. high.

SPECIES CULTIVATED: *M. maritima*, 'Virginia Stock', various colours, summer, 6 in., S. Europe.

Male Fern, see *Dryopteris Filix-mas*.

Mallow, see *Malva*; **Rose-**, see *Hibiscus*; **Tree-**, see *Lavatera*.

Malope—*Malvaceae*. Hardy annuals. First introduced early eighteenth century.

CULTURE: Soil, rich ordinary. Position, sunny beds, or in masses in borders. Water freely in dry weather. Apply stimulants occasionally when plants show flower.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pots or boxes of light soil in temp. 50° in March, transplanting into flowering positions in May or June; or by seeds sown $\frac{1}{2}$ in. deep and 4 to 6 in. apart where required to grow, in April or May.

SPECIES CULTIVATED: *M. trifida*, purple, summer, 2 to 3 ft., Spain, and vars. *alba*, white, *grandiflora*, crimson.

Malpighia—*Malpighiaceae*. Stove evergreen flowering shrubs or small trees. Some species cultivated for their cherry-like fruits. First introduced early eighteenth century.

CULTURE: Compost, equal parts sandy loam and fibrous peat. Position, well-

drained pots in stove or planted out in border of well-drained soil in warm greenhouse. Pot-grown specimens should be watered freely March to Oct., moderately afterwards.

PROPAGATION: By half-ripened cuttings inserted in sandy soil in propagating frame with bottom heat during summer, or under bell-glass with bottom heat. Repot, autumn or spring. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

SPECIES CULTIVATED: *M. coccigera*, pale pink, June to Aug., 2 ft., W. Indies; *glabra*, 'Barbados Cherry', purplish-rose, March to Sept., 8 to 12 ft., Trop. America; *nitida*, pink, March to July, 10 ft., Venezuela; *urens*, pink, June to Oct., 3 to 5 ft., W. Indies.

Malus (Apple)—*Rosaceae*. Hardy deciduous, spring-flowering, fruit-bearing trees and shrubs. Formerly included in *Pyrus*.

CULTURE OF APPLE: Soil, deep loam. Position, open or sheltered gardens, trained on walls, fences, etc. Plant, Nov. to March. Distance for planting: Cordons, 24 in.; dwarf pyramids, pillars, 5 ft.; bush-trained trees, 12 ft.; pyramids, 12 ft.; fan-trained trees, 15 ft.; espaliers, 18 ft.; standards, 21 to 24 ft. Distance from paths: pyramids, 5 ft.; bush-trained, 2½ ft. Mode of bearing: On spurs formed on older branches and base of shoots of previous year's growth. Fruit buds may be distinguished from growth buds by their plumpness and roundness. Summer pruning for trained trees; shorten side shoots 4 to 6 in. during July and Aug.; leave the leader unpruned. Secure to the wall suitably placed young shoots of fan-trained trees to form future branches, and summer-prune remaining ones. Standards and bush trees require no summer pruning. Winter pruning: Spur back summer-pruned shoots to within 1 to 2 in. of their base in dormant season. Leave extension shoots on espalier tiers unpruned. Bend cordons to a sharper angle to accommodate extension growth which is not shortened. Central leader of dwarf pyramid is shortened by half growth to opposite bud each year to keep it straight. About 5 in. of growth is allowed on each side branch cutting back to an under-bud. Prune laterals on bush trees according to vigour. Weak growths can be spurred back hard, those of medium vigour shortened by one-third of their growth and vigorous wood either removed or left unpruned. These long laterals will spur up at the base and can be shortened back to a fruit bud in later years. Simply thin out branches of standards, keeping the centre open, removing dead, diseased and crossing wood. Mulch newly-planted trees with thick layer of manure. Root-prune vigorous, unfruitful trees in Oct. or Nov. Gather fruit when, on lifting it by the hand from a vertical to a horizontal position, it readily parts from the tree. Store in dark, cool, frost-proof room. Manuring: Apply rotted farmyard manure as a mulch to extent of branch spread in spring and dig it in during following autumn. Use chemical fertilisers with regard to condition of the trees. Nitrogen to encourage growth, potash if leaves appear dried out, with ash-grey or brown margins. A good balanced mixture would be ¼ lb. sulphate of ammonia, ½ lb. superphosphate and 10 oz. sulphate of potash per in. of trunk diameter, hoed in lightly to beyond spread of branches in spring.

CULTURE OF ORNAMENTAL SPECIES: Soil, ordinary. Position, sunny borders or shrubberies or as specimens in open places. Plant, Nov. to Feb.

PROPAGATION: By seed sown outdoors in March for new sorts; grafting established vars. in March; budding in July and Aug. Ornamental species by seeds sown 3 in. deep in sandy soil in sunny position outdoors in Oct.; cuttings of shoots 8 to 12 in. long in ordinary soil outdoors in autumn; layering in autumn. Root stocks: budded in July or Aug. or grafted when sap is rising in April. Selected stocks of known vigour numbered by East Malling Research Station are: M IX Jaune de Metz, very dwarfing, used for cordons and other restricted forms; M VII, semi-dwarfing, used for cordons of tip-bearing vars. and for pyramid trees; M II Doucin, fairly vigorous and reliable for bush trees; M I English Broadleaf, less reliable than M II, especially on dry soils; M XVI Ketziner Ideal,

vigorous stock suitable for standard trees; Malling Crab C, another suitable vigorous stock for standard trees.

APPLE SPECIES CULTIVATED: *M. pumila* (syns. *M. sylvestris*, *M. communis*, *Pyrus Malus*), white or pink, fruits cultivated in many orchard vars., to 40 ft. or more, Europe, W. Asia.

ORNAMENTAL SPECIES CULTIVATED: *M. adstringens*, many forms of crab apple, some of them hybrids with *M. pumila*; *atrosanguinea*, rose-purple, 18 ft., hybrid; *baccata*, 'Siberian Crab Apple', white or pinkish, fruit yellow and red, to 40 ft., Siberia; *coronaria*, 'Garland Crab Apple', rose to white, sweet-scented, fruit yellow, hard, acid, to 30 ft., United States; *floribunda*, rose-red changing to white, fruit red, to 25 ft., Japan or China, and var. *Scheideckeri*, pale pink, semi-double, fruit yellow, 20 to 25 ft. *Halliana*, 'Hall Crab Apple', deep rose, fruit purple, to 18 ft., China, and var. *Parkmanii*, double; *ioensis*, white or pink, fruit greenish, 30 ft., N. America; *prunifolia*, white, fruit yellow or red, 15 to 20 ft., N.E. Asia, and var. *Rinkii*, pink, fruit red; *pumila* and vars. *Niedzwetzkyana*, deep red, fruit skin and flesh-purple-red, bark and leaves reddish, *paradisiaca*, 'Paradise Apple', shrubby form; *purpurea*, leaves purple when young, fruit small, purple, 15 to 20 ft., hybrid, and vars. *aldenhamensis*, partly double, light red, fruit purple-red, *Lemoinei*, dark crimson, small red fruits, brown-red leaves; *Sargentii*, white, fruit dark red, 6 ft., Japan; *Sieboldii*, pink, small red or yellowish fruits, 15 ft., Japan, and var. *arborescens*, white, to 30 ft.; *spectabilis*, showy, pink, fruit yellow, to 25 ft., China; *toringoides*, creamy white, fruit yellow and reddish, 25 ft., China; *yunnanensis*, white, fruit red, leaves orange and red in autumn, to 25 ft., W. China, and var. *Veitchii*, white, fruit red spotted white.

Malva (Mallow)—*Malvaceae*. Hardy annual and perennial flowering plants.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny or partially shaded beds or borders. Plant, Oct. or March. Mulch with manure in autumn.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny. Plant, May or June.

PROPAGATION: Annual species by seeds sown $\frac{1}{8}$ in. deep in light, sandy soil in temp. 55° in March or April; perennial species by seeds sown similarly, or by cuttings inserted in cold frame in July or Aug.

ANNUAL SPECIES CULTIVATED: *M. crispa*, white and purple, summer, 3 to 6 ft., Europe; *sylvestris*, purple-rose, summer, 2 to 3 ft., Europe, biennial usually grown as annual, var. *mauritiana*, purple, summer, 3 to 4 ft.

PERENNIAL SPECIES CULTIVATED: *M. Alcea*, rosy purple, summer, 4 ft., Europe, best grown as an annual; *moschata*, 'Musk Mallow', rose, summer, 3 ft., Britain, and var. *alba*, white. See also *Malvastrum*.

Malvastrum (False Mallow)—*Malvaceae*. Hardy perennials. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny rockeries for dwarf species; sunny well-drained borders for tall species. Plant, Oct. or March. Protect in severe winters with a layer of cinder ashes or leaf-mould.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light, sandy soil in temp. 55° in March or April; cuttings inserted in cold frame in July or Aug.

SPECIES CULTIVATED: *M. coccineum*, scarlet, July to Sept., 6 in., U. States; *Gilliesii*, red, summer, 6 in., S. America; *lateritium* (syn. *Malva lateritia*), salmon-pink, summer, 1 ft., Uruguay.

Malvaviscus—*Malvaceae*. Greenhouse evergreen shrubs. First introduced early eighteenth century.

CULTURE: Compost, two parts fibrous loam, one part fibrous peat and leaf-mould with a liberal admixture of broken charcoal and silver sand. Position, well-drained pots or border in warm greenhouse. Pot or plant during spring. Prune into shape after flowering. Water moderately Oct. to March, freely at other times. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings of side shoots inserted in sandy soil under bell-glass or in propagating case in heat, spring or summer.

SPECIES CULTIVATED: *M. arboreus*, scarlet, summer, 12 ft., S. America; *Conzattii*, scarlet, winter, 10 to 15 ft., Mexico.

Mammillaria—*Cactaceae*. Greenhouse succulent perennials. Flowers generally expanding about 11 a.m. and closing at 1 p.m.; somewhat fugitive. Stems leafless, cylindrical or globular, bearing small tubercles or teats crowned with rosettes or stars of spines evenly spaced over their surface. First introduced late seventeenth century.

CULTURE: Compost, equal parts sandy loam, rough old mortar and pounded bricks. Position, sunny, airy greenhouse or window. Pot, March or April, in well-drained pots just large enough to accommodate roots. Repot every third or fourth year only. Water moderately March to Sept., once a fortnight, Sept. to Dec., none afterwards. Syringe on evenings of warm days June to Sept. Apply soot-water to healthy plants June to Sept. Ventilate freely in summer. Temp., March to Sept. 60° to 70°, Sept. to March 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in well-drained pans or pots of sandy soil in temp. 75° in March, keeping soil moderately moist; by cuttings of the tops of the plants inserted in small pots of sandy, gritty compost in spring; by grafting on *Cereus speciosissimus* at any time.

SPECIES CULTIVATED: *M. compressa* (syn. *M. angularis*), rosy purple, summer, 4 to 8 in., Mexico; *echinaria*, rose, summer, 6 in., Mexico; *elongata* (syn. *M. Stella-aurata*), yellow, summer, 3 in., Mexico; *floribunda*, rose, summer, 5 in., Chile; *geminispina* (syn. *M. bicolor*), purple, June, 6 to 12 in., Mexico; *Haageana*, carmine rose, June, 4 in., Mexico; *multiceps*, yellow and red, summer, 1 ft., Mexico; *Neumanniana*, rose, summer, 6 in., Mexico; *pulchra*, rose, June, 4 in., Mexico; *pyncacantha*, yellow, July, 6 in., Mexico; *Schelhasei*, white and rose, summer, 4 in., Mexico; *Schiedeana*, white, summer, 3 in., Mexico; *sempervivi*, 3 in., Mexico; *spinosissima* (syn. *A. sanguinea*), crimson, June, 6 in., Mexico; *tetracantha*, rose, July, 9 in., Mexico; *turbinata*, yellow, June, Mexico; *uncinata*, purple, May and June, 4 in., Mexico; *vetula*, yellow, May and June, 3 in., Mexico; *villifera*, rose and purple, May, 3 in., Mexico; *viridis*, yellow, May and June, 4 in., Mexico; *Wildii*, rose, summer, 3 to 4 in., Mexico; *Wrightii*, purple, May, Mexico; *Zuccariniana*, purple, May and June, 3 in., Mexico.

Mammoth Tree of California, see *Sequoiadendron giganteum*.

Mandevilla—*Apocynaceae*. Greenhouse flowering deciduous climber. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat and loam, half-part each of sand and pounded charcoal. Position, well-drained beds or borders; shoots trained up trellis, pillars, or roof of sunny greenhouse. Plant, Feb. Water freely Feb. to Sept., moderately Sept. to Dec., none afterwards. Syringe twice daily Feb. to July. Temp., Feb. to Sept. 55° to 65°, Sept. to Dec. 45° to 55°, Dec. to Feb. 40° to 50°. Prune shoots to within two buds of their base immediately after flowering.

PROPAGATION: By seeds sown in pans or bed of sandy peat slightly covered with fine soil in a temp. of 65° to 75°, Feb. to April; cuttings of firm side shoots, 2 to 3 in. long, inserted in sand under bell-glass in temp. of 70° to 85° in summer.

SPECIES CULTIVATED: *M. laxa* (syn. *M. suaveolens*), 'Chilean Jasmine', white, fragrant, summer, 15 to 30 ft., Buenos Ayres.

Mandragora (Mandrake)—*Solanaceae*. Hardy perennial herbs. First introduced early sixteenth century.

CULTURE: Soil, deep rich. Position, well-drained sunny borders. Plant, Oct. or March.

PROPAGATION: By seeds sown in pans or boxes in cool greenhouse in March; careful division in March.

SPECIES CULTIVATED: *M. autumnalis*, violet, Sept., 6 to 12 in., S. Europe; *officinarium*, 'Devil's Apple', greenish yellow, May, 1 ft., S. Europe.

Manettia—*Rubiaceae*. Greenhouse evergreen climber. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam and peat, with a liberal admixture of pounded charcoal and silver sand. Position, well-drained pots or beds; shoots trained to trellises, round pillars, or up rafters. Plant, Feb. to March. Prune slightly after flowering. Water freely March to Sept., moderately afterwards. Syringe daily March to Sept. Temp., Feb. to Oct. 55° to 65°, Oct. to Feb. 45° to 55°.

PROPAGATION: By seeds sown in shallow pans of sandy soil, slightly covered with fine soil, and placed in temp. 55° to 65°, Feb. or March; cuttings of young shoots, 2 to 3 in. long, inserted in small pots of sandy soil in temp. 65° to 75° in summer.

SPECIES CULTIVATED: *M. bicolor*, scarlet and orange, Brazil; *glabra*, scarlet, Aug. to Oct., S. America; *inflata*, scarlet and orange, March to Dec., 10 to 15 ft. Paraguay and Uruguay.

Mangel, Mangold, see *Beta vulgaris*.

Mangosteen Tree, see *Garcinia Mangostana*.

Manihot—*Euphorbiaceae*. Stove and greenhouse herbs or evergreen shrubs with ornamental foliage. Some species of great economic value. First introduced early eighteenth century.

CULTURE: Compost, equal parts fibrous loam, peat and leaf-mould, with sharp sand and crushed charcoal added. Position, well-drained pots or tubs in warm greenhouse or stove, or planted out in border of well-drained soil. Pot or plant, March or April. Water freely March to Sept., moderately afterwards. Keep deciduous type dry at roots during winter. Temp., March to Oct. 65° to 75°, Oct. to March 50° to 60°.

PROPAGATION: By cuttings of firm young shoots inserted in sand or sandy peat under bell-glass or in a warm propagating case with bottom heat in spring.

SPECIES CULTIVATED: *M. dulcis*, shrub to 9 ft. with edible roots, S. America, and var. *Aipi*, 'Sweet Cassava'; *esculenta* (syn. *M. utilissima*), 'Tapioca', 'Cassava', yellowish with attractive foliage, summer, 3 ft., Brazil, and var. *variegata*, a most handsome ornamental plant; *Glaziovii*, 'Ceara Rubber', tree to 30 ft., Brazil.

Manila Hemp, see *Musa textilis*.

Maple, see *Acer*; **Flowering-**, see *Abutilon*.

Maranta—*Marantaceae*. Stove herbaceous perennials with ornamental foliage. First introduced early eighteenth century.

CULTURE: Compost, two parts fibrous peat, one part rich loam, one part sand. Position, well-drained pots in shady part of stove. Pot, Feb. or March. Water abundantly March to Sept., moderately Sept. to Dec., keep nearly dry afterwards. Syringe daily March to Sept. Apply weak stimulants occasionally during summer. Temp., Feb. to Oct. 65° to 75°, Oct. to Feb. 55° to 65°. Repot annually.

PROPAGATION: By division of tubers or rhizomes in Feb. or March.

SPECIES CULTIVATED: *M. arundinacea*, 'Arrowroot', white, to 6 ft., Trop. America, and var. *variegata*, leaves green and white; *bicolor*, leaves olive green, 1 ft., Brazil; *leuconeura*, leaves light green, white, and purple, 1 ft., Brazil, and vars. *Kerchoveana*, leaves spotted with red, and *Massangeana*, leaves purple beneath. See also *Calathea*.

Marattia—*Marattiaceae*. Greenhouse evergreen ferns with long, feather-shaped fronds; leaflets twice or three times divided. First introduced late eighteenth century.

CULTURE: Compost, two parts peat, one each of loam, leaf-mould and sand. Position, large well-drained pots or moist beds. Pot or plant, Feb. or March. Shade from sun essential. Water freely March to Oct., moderately afterwards. Syringing not required. Temp., Feb. to Oct. 60° to 70°, Oct. to Feb. 50° to 60°.

PROPAGATION: By spores sown on surface of sandy peat in shallow, well-drained pans placed under bell-glass in temp. 65° to 75° any time.

SPECIES CULTIVATED: *M. alata*, Cent. America; *attenuata* (syn. *M. Conperi*), fronds to 4 ft., New Caledonia; *fraxinea*, 'Ash Leaf Fern', fronds to 12 ft., S. Africa, Malaya, New Zealand; *laxa*, large, fleshy fronds, Mexico.

Mare's Tail, see *Hippuris*.

Marguerite, see *Chrysanthemum frutescens*; **Blue-**, see *Felicia amelloides*; **Golden-**, see *Anthemis tinctoria*.

Marigold, see *Tagetes*; **Pot- or Scotch-**, see *Calendula*.

Marica, see *Neomarica*.

Margyricarpus—*Rosaceae*. Hardy evergreen trailing shrub. First introduced early nineteenth century.

CULTURE: Soil, equal parts leaf-mould, loam and sand. Position, sunny rockery, with shoots trailing over stones. Plant, Feb. to May.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shallow boxes of light, sandy soil in cold frame in autumn or spring; cuttings of young shoots, 1 to 2 in. long, inserted in sandy peat under bell-glass in cold frame in summer; layering branches in Sept. or Oct.

SPECIES CULTIVATED: *M. setosus*, 'Pearl Fruit', green, summer, berries white, prostrate, Chile.

Marjoram, see *Majorana*.

Marmalade Plum, see *Achras Zapota*.

Marrubium (Horehound)—*Labiatae*. Hardy perennial medicinal herb. Leaves and young shoots used as a popular remedy for coughs.

CULTURE: Soil, ordinary. Position, sunny, dry borders. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in shady position outdoors, March to May; cuttings inserted in shady border in April; division of roots in March.

SPECIES CULTIVATED: *M. vulgare*, white, June to Sept., 1 ft., Britain.

Marsh Calla, see *Calla palustris*; **-Fern**, see *Dryopteris Thelypteris*; **-Hypericum**, see *Hydrocleys elodes*; **-Mallow**, see *Althaea officinalis*; **-Marigold**, see *Caltha palustris*; **-Rosemary**, see *Ledum palustre* and *Andromeda polifolia*; **-Trefoil**, see *Menyanthes trifoliata*.

Markhamia—*Bignoniaceae*. Tropical trees and shrubs with large, persistent, pinnately compound leaves and tubular-funnel shaped flowers in panicles.

CULTURE: Compost, ordinary. Position, warm or cool greenhouse.

PROPAGATION: By seed.

SPECIES CULTIVATED: *M. platycalyx*, yellow, Aug. to Sept. tree to 35 ft. or more, Cent. Africa.

Martynia—*Martyniaceae*. Half-hardy annual. See also *Ibicella* and *Proboscidea*.

CULTURE: Sow seed in warm house in March, prick off and grow on in genial warmth until danger of frost is past, when they can be planted out in warm position.

SPECIES CULTIVATED: *M. annua*, reddish-purple, summer, Cent. America, W. Indies.

Marvel of Peru, see *Mirabilis Jalapa*.

Maryland Dittany, see *Cunila origanoides*; **-Pink Root**, see *Spigelia marilandica*.

Masdevallia—*Orchidaceae*. A large epiphytic genus, pseudo-bulbs absent, stems short, clustered, peduncles sheathed from their base, leaves single. Several sections are made. Flowers brightly coloured in many. Some made more distinctive by the sepals, the larger of the segments having their extremities developed into tails. The *Chimaera* section has the sepals spreading, the lip in evidence. In many of the others, their bases assume a more or less tubular form, concealing, or nearly so, the smaller petals and lip. In the *coccinea* group, the two lower

sepals are spread and are brightly coloured, the tails on the lower sepals very short. Variations and gradations occur throughout.

CULTURE: Compost and general treatment and temp. should be as for *Odontoglossums* of the *O. crispum* type. As all are pseudo-bulbless, rest is prohibited. At no time should the compost be allowed to become really dry. Pans or well-drained pots suit the majority. A moist atmosphere should be maintained. Shading is necessary. The *Chimaera* section should not fall below 50° in the winter, 55° is better, but during the spring, summer and early autumn the *Odontoglossum* house suits. Their flowers are often produced in succession on thin wiry peduncles, often laterally inclined, hence small baskets for them are better than pots. If pans are used, slightly mound the compost centrally. Suspend them near the glass, night air should be admitted whenever weather allows. Draughts must be avoided. A black smudge sometimes seen, principally on the backs of the leaves, is often due to lack of sweet air. A change of position often benefits. Stale compost may also be the cause. Several hybrids have been raised and a few occur naturally.

PROPAGATION: By division of plants in early spring.

SPECIES CULTIVATED: A selection—*M. amabilis*, orange-red to orange-yellow, with crimson veins, tails dull red, spring, summer, Colombia; *angulata*, large, dull crimson-red, tails short, autumn, Ecuador; *Barlaeana*, tube bent, coral-red above, tails red, lower sepals carmine, lined crimson, summer, Peru; *bella*, solitary, large, yellowish, thickly spotted chocolate-red, upper tail 3 or 4 in. long, lip shell-shape, ribbed, autumn, various vars. Colombia; *caloptera*, small, 2-3 whitish, violet purple, tails short, yellow, various, Peru; *calura*, chocolate-red, tails orange-yellow, the lower shorter, spring, summer, Costa Rica; *Carderi*, bell-shaped, whitish, blotched purple-brown, tails yellow, pendent, summer, autumn, Colombia; *caudata*, dwarf, tube open, large, yellow, spotted and marked red, lower sepals mauve-purple mottled white, tails divergent, yellow, and var. *xanthocorys*, smaller, yellow, rose spotted and flushed; *Chestertonii*, comparatively small, in succession, greenish-yellow, marked black-purple, lip yellowish, ribs red, tails short, blackish, summer, autumn, Colombia; *Chimaera*, variable, large, in succession, yellowish, hispid, with dark red spots, lip slipper-shape, ribbed, tails reddish, 3 to 4 in. long, various seasons, Colombia, and many vars.; *coccinea* (syn. *M. Harryana*), beautiful, very variable, magenta-purple, tube short, upper sepal smaller than lower, tails erect, spring, Colombia, among the many named vars. are *alba*, creamy white, *armeniaca*, apricot, *atrosanguinea*, blood-red, *Gravesiae*, white, tinged buff, *Lindenii*, lilac-magenta, *Sanderæ*, white, yellow tinged, *coriacea*, tube rather large, tails short, broad, whitish, yellow shaded, purple spotted, *corniculata*, brownish-red, tails yellow, large bract behind, summer, Colombia; *Davisii*, yellow with orange marking, tail erect, spring, summer, Peru; *deorsa*, pendent habit, buff yellow and purplish-brown, upper tail 2½ in. long, yellow, lower, shorter, summer, Colombia; *elephanticeps* (syn. *M. Gargantua*), large, scape short, tube large, yellowish, purplish-red, tails yellow upper 2 to 3 in. long, variable, malodorous, various seasons, Colombia; *ephippium* (syn. *M. trochilus*), scape 3-sided, yellowish-brown to chestnut-brown, lower sepals forming a ribbed cup, tails yellow, 3 to 4 in. long, flowers in succession, autumn, Colombia; *igneæ*, cinnabar red, crimson veined, dorsal tail always inclined downwards, spring, Colombia, and var. *militaris* (syn. *M. militaris*), brilliant red and scarlet; *muscosa*, scape erect with short stiff hairs, flowers, 1 or 2, brownish, tails short, yellowish, lip projecting, on being touched by an insect it snaps up enclosing the insect for a short time, spring, autumn, Colombia; *polysticta*, scapes erect, flowers rather small, tube short, white, purple spotted, tails stiff, yellow, spring, Peru; *Schroderiana*, whitish to purple, tails yellow, tube campanulate, spring, Colombia; *touarensis*, pure white, winter, Venezuela; *trinema* (syn. *M. Lowii*), whitish, thickly spotted red-purple, lip small, various, Colombia; *Veitchiana*, very fine, large, brilliant orange, with crimson-purple papillae on outer halves of lower sepals, upper tail 1 to 2 in. long, spring, Peru, and var. *grandiflora*, larger, more brilliant.

Maskflower, see *Alonsoa*.

Mastic, see *Pistacia Lentiscus*.

Masterwort, see *Astrantia*.

Mathiola (Stock)—*Cruciferae*. Annual, biennial or perennial herbs. Sometimes spelt *Matthiola*. First introduced early eighteenth century.

CULTURE OF TEN-WEEK STOCK OUTDOORS: Soil, deep, rich, well manured. Position, open, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 50° to 55° in March, transplanting seedlings outdoors end of May; or in cold frame or outdoors in April, transplanting seedlings in June. Plant, dwarf kinds 9 in. and tall kinds 12 to 15 in. apart each way. Mulch surface of soil after planting, with decayed manure. Remove seed pods as they form.

POT CULTURE OF TEN-WEEK STOCK: Sow seeds as above advised. Transplant three seedlings 1 in. high into a 3 in. pot, and when 3 to 4 in. high into a 5 in. pot. Compost, two parts good soil, one part decayed manure and sand. Position, cold frame during May; afterwards outdoors. Water freely.

CULTURE OF WALLFLOWER-LEAVED STOCK: As for Brompton.

CULTURE OF NIGHT-SCENTED STOCK: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in April where required to flower.

CULTURE OF INTERMEDIATE STOCK: Sow seeds $\frac{1}{8}$ in. deep in light soil in well-drained pots or boxes in cold frame in June or July. Transplant seedlings when 1 in. high singly in a 2 in. pot or four in a 4 in. pot, or in sheltered border out of doors. Compost, equal parts loam, leaf-mould and old mortar. Plunge pots to rim in cinder ashes in sunny, cold frame. Water sparingly. Ventilate freely in fine weather. Plant out in rich soil in March, or transfer single plants to a 5 in. or three plants to a 6 in. pot. Water moderately. For autumn flowering, sow seeds in March or April and plant out in June.

CULTURE OF BROMPTON AND QUEEN STOCKS: Sow seeds $\frac{1}{8}$ in. deep in light soil in cold frame in June or July. Transplant seedlings when 1 in. high 8 to 12 in. apart where required to flower following year; or place singly in 2 in. pots, keep in cold frame, and plant out in March. Seed saving: Largest percentage of double flowers obtained from plants grown in poor soil and of the dwarfiest habit.

SPECIES CULTIVATED: *M. bicornis*, 'Night-scented Stock', lilac, summer, fragrant at night, 1 ft., annual, Greece; *incana*, 'Brompton Stock', purple varying to yellow, white, blush, fragrant, often double, spring to summer, 1 to 2 ft., biennial or perennial, S. Europe, and var. *annua* (syn. *M. annua*), 'Ten-Week Stock', 'Intermediate Stock', annual.

Matricaria—*Compositae*. Hardy perennial herb.

CULTURE: Soil, ordinary. Position, open, sunny beds or borders. Plant, Oct., March or April.

PROPAGATION: By cuttings inserted in ordinary soil in shady position outdoors in spring; division of roots in March.

SPECIES CULTIVATED: *M. inodora plenissima*, 'Double Mayweed', white, double, summer, 1 ft., Britain.

Matteuccia, see *Pteretis*.

Matrimony Vine, see *Lycium*.

Maurandia—*Scrophulariaceae*. Half-hardy climbing perennials. First introduced late eighteenth century.

INDOOR CULTURE: Compost, equal parts loam and leaf-mould and little sand. Pot, March to May. Position, well-drained pots with shoots draping over front of stage, or trained up trellises, walls, or rafters, or suspended in baskets in sunny greenhouse. Water freely March to Sept., moderately Sept. to Nov., keep nearly dry afterwards. Apply stimulants to healthy plants in flower only. Temp., March to Sept. 55° to 65° , Sept. to March 45° to 55° .

OUTDOOR CULTURE: Soil, ordinary rich. Position, against south walls or in sunny vases or window boxes. Plant, June. Lift, repot and place in greenhouse in Sept. Water freely in dry weather.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in ordinary light soil in temp. of 60° to 70° in March, transplanting seedlings when 1 in. high singly into 2 or 3 in. pots; cuttings of young shoots inserted in sandy soil under bell-glass in temp. 55° to 65°, March to Aug.

SPECIES CULTIVATED: *M. Barclaiana*, violet-purple, summer, Mexico; *erubescens* (commonly grown as *M. scandens*), rose and white, summer, Mexico; *Purpusii*, violet, summer, to 2 ft., Mexico; *scandens*, purple and violet, summer, Mexico.

Maxillaria—Orchidaceae. An epiphytic genus, over 200 species, varying greatly, many of minor interest and attraction, others of considerable size and beauty. Pseudo-bulbs general, absent in a few. Scapes, single flowered, from base. A few are scandent or ascendent in habit, others bear a single, rather large, leaf, keeled behind, at the apex of the pseudo-bulbs, the greater number have more or less ovoid pseudo-bulbs with one or two strap-shaped, persistent leaves.

CULTURE: The variation demands slight differences in treatment. Compost for all can consist of three parts osmunda fibre, one part sphagnum moss. Peat may be used but should have finely crushed potsherds incorporated. Pots, well drained, are suitable, but the very small-growing kinds should have pans and, more moss. The winter rest must be governed by the nature of the plant. For hard-bulbed, hard-leaved species it should be decided, occasional waterings may be required. For the species with strongly keeled leaves, e.g. *M. venusta*, *M. Sanderiana*, water can seldom be withheld for more than a week or two, and their winter temp. should not fall below 55° nor should the syringe be used too freely on them or brown spots appear on their foliage. On other forms it may be freely used as soon as the leaves are free. Like *Lycaste*, they are well suited to the cool house, with a winter night temp. of 50°, no pipe heat in the summer, light shading is required, air at night when favourable. Summer temp. with humidity and by sun heat with shading can rise to 75° or 80°.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: A selection—*M. acutipetala*, orange-yellow, blotched red, lip whitish, spring, Cent. America; *crocea*, yellow segments, tapered, autumn, spring, Brazil; *dichroma*, fleshy, white, flushed fawn and red in parts, autumn, winter, Ecuador; *elegantula*, white, chrome-yellow, chocolate-red and red spots, lip margined red, usually summer, Ecuador; *Fletcheriana*, large, cream-white, purplish-red lined, lip large, yellow, purple marked, spring, Peru; *fractiflexa*, sepals and petals 6 in. long, twisted, white, flushed purple, various, Ecuador; *fucata*, white, terra cotta, yellow, red spotted, lip red-brown, yellow, spring, summer, Ecuador; *grandiflora*, white, lip yellowish with flushes and streaks of crimson, spring, Ecuador, Brazil, Peru; *iridifolia*, pendent, small, yellowish, spring, summer, Brazil, W. Indies; *lepidota*, sepals long, tapered, yellow to purple-brown, petals yellow, autumn, Colombia; *Lindeniae*, large, white, lip margined red, winter, Ecuador; *luteo alba*, large, white and tawny yellow, spring, various, Venezuela; *macrura* (syn. *M. longisepala*), dark red, sepals and petals narrow, long, drooping, summer, various, Venezuela; *nigrescens*, brownish wine-purple, winter, spring, Colombia; *oceophylla*, large, old gold, copper-brown, mid-lobe of lip white, various, habitat unknown; *ochroleuca*, fragrant, segments narrow, whitish, yellowish, scapes fasciated, spring, summer, Brazil; *praestans*, yellowish, red dotted, spring, Guatemala; *Sanderiana*, very large, whitish, blotched blood-red, variable, basket, spring, Ecuador; *scurrilis*, segments narrow, long, white, blotched blackish brown, summer, Colombia; *striata*, large, yellow, striped and streaked chocolate-red, autumn, Ecuador, and var. *grandiflora*, larger, more richly coloured; *tenuifolia*, ascendant habit, dark red, broken with yellow, needs a support, summer, autumn, Mexico; *venusta*, very fragrant, large, white, segments tapered, autumn, Colombia, Venezuela.

May, see *Crataegus Oxyacantha*; **-Apple**, see *Podophyllum*; **-flower**, see *Epigaea repens*; **-Lily**, see *Convallaria*.

Mazus—*Scrophulariaceae*. Hardy dwarf perennial herbs, suitable for rockery culture. First introduced late eighteenth century.

CULTURE: Soil, moist, sandy loam. Position, sunny rockery. Plant in spring.

PROPAGATION: By seeds sown in sandy soil in April in a cold frame, the seedlings being grown on until the following spring before planting out; by division of the tufts in spring.

SPECIES CULTIVATED: *M. Pumilio*, purplish blue, May to Oct., 2 in., New Zealand; *reptans*, rosy lavender, white and brown, May to Oct., 1 in., Himalaya; *japonicus* (syn. *M. rugosus*), lilac-blue, summer, Asia.

Meadow Beauty, see *Rhexia*; **-Rue**, see *Thalictrum*; **-sweet**, see *Filipendula*.

Meconopsis—*Papaveraceae*. Hardy monocarpic and perennial herbs.

CULTURE OF MONOCARPIC SPECIES: Sow seeds $\frac{1}{8}$ in. deep in light, sandy soil in temp. 60° to 70° in March or April. Transplant seedlings when large enough to handle into a cold frame and plant out in permanent positions as soon as they have formed tufts of seven or eight leaves each. Soil, deep loam with sand, leaf-mould and peat. Position, well-drained sunny rockery. Water freely in summer; keep dry as possible in winter. Monocarpic species flower when two to four years old and afterwards die.

CULTURE OF PERENNIAL SPECIES: Soil, deep rich loam mixed freely with decayed manure and leaf-mould. Position, sunny, sheltered borders or rockeries. Plant, March or April. Water, as above advised.

PROPAGATION: Perennial species by seeds sown $\frac{1}{8}$ in. deep in light, sandy soil in temp. 55° to 60° as soon as ripe or in Feb. or March, transplanting as advised above for monocarpic species.

MONOCARPIC SPECIES CULTIVATED: *M. aculeata*, pale blue and violet, 12 to 16 in., N.W. Himalaya; *Delavayi*, violet, 6 to 8 in., W. China; *horridula*, blue, to 5 ft., Cent. and E. Asia; *integrifolia*, primrose yellow, May to Aug., 18 in., W. China; *lancifolia*, violet, 3 to 6 in., Cent. Asia; *paniculata*, yellow, July to Aug., 5 to 6 ft., W. China; *punicea*, crimson, late autumn, 1 to 1½ ft., Tibet; *pseudo-integrifolia*, sulphur yellow, 6 to 8 in., W. China; *racemosa*, lavender blue or violet, 18 in., W. China and Tibet; *rigidiuscula*, blue, 2 to 2½ ft., E. Asia; *simplicifolia*, sky blue, summer, 2 ft., Himalaya; *sinuata*, pale blue, May to June, 1 to 1½ ft., E. Himalaya.

PERENNIAL SPECIES CULTIVATED: *M. betonicifolia*, 'Himalayan Poppy', 'Tibetan Poppy', 'Blue Poppy', azure blue, June and July, 3 to 4 ft., Himalaya, and var. *Baileyi* (syn. *M. Baileyi*), the form usually cultivated; *cambrica*, 'Welsh Poppy', yellow, summer, 1 ft., Europe (Br.), and var. *plena*, double-flowered; *grandis*, violet blue or slaty blue, June, 3 ft., Sikkim; *napaulensis* (syn. *M. Wallichii*), 'Satin Poppy', blue, summer, 4 to 6 ft., Himalaya; *quintuplinervia*, lavender blue, May, 12 to 18 in., Tibet; *regia*, yellow flowers, ornamental foliage, summer, 2 ft., Nepal.

Medicago—*Leguminosae*. Hardy annual. Flowers succeeded by curiously twisted legumes. First introduced early nineteenth century.

CULTURE: Sow seeds $\frac{1}{2}$ in. deep in ordinary soil in sunny position outdoors, April or May. Thin seedlings when 1 in. high to 6 in. apart. Water freely in dry weather.

POT CULTURE: Compost, any good soil. Sow seeds thinly in 5 in. pots filled with above compost. When seedlings are 1 in. high, thin to 3 in each pot. Water moderately. Position, sunny window or greenhouse.

SPECIES CULTIVATED: *M. Echinus*, 'Calvary Clover', yellow, summer, 6 in., S. Europe.

Medinilla—*Melastomaceae*. Stove evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous peat, one part loam, half part sand, half part well-decayed manure. Position, sunny, moist part of stove Feb. to Sept.; light and moderately dry part afterwards. Pot, Feb. Temp., Feb. to Sept. 75° to 85°, Sept. to Nov. 70° to 80°, Nov. to Feb. 65° to 75°. Water freely March to Sept., moderately afterwards. Syringe twice daily March to Sept. Moist atmosphere very essential. Apply stimulants when plants commence flowering. Prune straggling shoots into shape, Jan. or Feb.

PROPAGATION: By cuttings of firm young side shoots, 3 to 4 in. long, inserted in sandy peat and leaf-mould under bell-glass in temp. 85° in spring or summer.

SPECIES CULTIVATED: *M. Curtisii*, white, Sumatra; *javanensis*, pale pink, winter, 4 ft., Java; *magnifica*, rosy pink, May, 4 ft., Philippines, and var. *superba*; *Teysmannii* (syn. *M. amabilis*), rosy pink, spring, 4 ft., Java.

Medlar, see *Mespilus germanica*.

Megaclinium—*Orchidaceae*. An epiphytic genus, allied to *Bulbophyllum*. Flowers similar in structure to those of *Bulbophyllum*, small, placed generally on both sides of a curiously enlarged, flattened rachis, on the central rib. In many the rachis, 3 to 6 in. long, is bent at right-angles to the peduncle. The majority in cultivation are small-growing, with hard bulbs and leaves.

CULTURE: Compost, as for *Bulbophyllum*. Coming from Africa they enjoy a warm moist atmosphere. Pans are preferable to pots as they can be suspended near the glass. A rather decided rest should be given. Winter temp. 60° to 70°.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: A selection—*M. Clarkei*, greenish, purplish, brown, spring, West Coast of Africa; *eburneum*, ivory white, yellow, spring, Gold Coast; *falcatum*, reddish-brown, Sierra Leone; *leucorachis*, yellow, summer, Upper Guinea; *maximum*, yellowish, variable, often spotted red-brown, summer, Sierra Leone; *purpureo-rachis*, yellowish shaded brown, spotted purple-red, broad, spiralled, 2 ft. high, spring, various, West Coast of Africa.

Megasea, see *Bergenia*.

Melaleuca—*Myrtaceae*. Greenhouse flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, loam and silver sand. Position, pots in greenhouse or well-drained borders in the open at base of south wall in the mildest counties. Pot or plant, March or April. Prune shoots a little after flowering. Water freely April to Sept., moderately afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By cuttings of nearly ripened shoots inserted in sandy peat under hand-light in temp. 55° to 65° during July or Aug.

SPECIES CULTIVATED: *M. armillaris*, white, June, 10 to 30 ft., Australia; *decussata*, lilac, Aug., 15 to 20 ft., Australia; *ericifolia*, yellowish white, July to Sept., 15 to 20 ft., Australia; *hypericifolia*, rich red, July to Aug., 10 to 20 ft., Australia; *Leucadendra*, 'Cajuput-tree', creamy white, 20 ft., or more, Australia; *linariifolia*, white, 15 to 20 ft., Australia; *striata*, pink, June, 4 ft., Australia; *thymifolia*, purple, June to Sept., 2 ft., Australia.

Melandrium, see *Lychnis*.

Melia (Bead-tree)—*Meliaceae*. Slightly tender deciduous flowering tree with graceful, feather-shaped, green leaves. First introduced mid-seventeenth century.

CULTURE: Soil, sandy loam. Position, large well-drained pots in cool greenhouse or conservatory, or sheltered shrubberies outdoors south of England. Pot or plant, Oct. to Feb. Water freely (in pots) March to Oct., little afterwards.

PROPAGATION: By cuttings inserted in sand under bell-glass in temp. 55° to 65°, summer or autumn.

SPECIES CULTIVATED: *M. Azadirachta*, bluish, summer, to 20 ft., India; *Azedarach*, 'Indian Lilac', lilac, summer, leaves fragrant, to 40 ft., India and China, and var. *umbraculiformis*, 'Texas Umbrella Tree'.

Melianthus—*Melanthaceae*. Slightly tender evergreen shrubs with graceful, feather-shaped, green leaves. First introduced late seventeenth century.

POT CULTURE: Compost, two parts loam, one part leaf-mould and sand. Position, well-drained pots in sunny greenhouse. Pot, Feb. or April. Water freely March to Oct., moderately afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

OUTDOOR CULTURE: Soil, ordinary rich. Position, sunny beds or borders. Plant, May or June. Cover roots and base of plant with dry litter in late Sept. as protection from frost or else lift, pot and winter in cool greenhouse or conservatory. May be grown entirely outdoors in warm, sheltered parts of England.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light, sandy soil in temp. 65° to 75° in Jan., Feb. or March, or in similar soil in temp. 55° to 65° in Aug. or Sept.; by cuttings inserted in light, sandy soil under bell-glass in temp. 55° to 65° in spring or summer.

SPECIES CULTIVATED: *M. comosus*, orange-red and green, autumn, 3 to 5 ft., S. Africa; *major*, 'Cape Honey Flower', brown, summer, 4 to 6 ft., S. Africa; *minor*, dark brown, Aug., 5 ft., S. Africa; *pectinatus*, scarlet, winter, 6 to 10 ft., S. Africa.

Meliosma—*Sabiaceae*. Deciduous trees and shrubs. Hardy, or nearly so, with panicles of spiraea-like flowers. First introduced late nineteenth century.

CULTURE: Soil, good loamy. Position, sheltered shrubberies, or as specimen plants on lawns. *M. myriantha* requires protection when young in all but the mildest parts of the country.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy soil and slight bottom heat during July.

SPECIES CULTIVATED: *M. cuneifolia*, yellowish white, fragrant, summer, to 20 ft., W. China; *myriantha*, yellowish white, fragrant, June to July, 20 ft., Japan, etc.; *Veitchiorum*, white, purplish-black berries, 30 to 40 ft., W. China.

Melissa (Balm)—*Labiatae*. Hardy herbaceous perennials with lemon-scented leaves; used in seasoning and liqueurs, and also as medicine.

CULTURE: Soil, ordinary light. Position, warm, sunny beds or borders. Plant, Oct. or March in groups or 12 in. apart in rows. Gather stems when flowers open for drying for winter use. Cut stems off close to ground after flowering.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in March; division of roots in Oct. or March.

SPECIES CULTIVATED: *M. officinalis*, 'Balm', white or yellow, summer, 3 ft., Europe (Br.), and var. *variegata*, leaves golden.

Melittis—*Labiatae*. Hardy perennial.

CULTURE: Soil, ordinary rich. Position, partially shaded beds or borders. Plant, Oct., March, or April.

PROPAGATION: By division of roots directly after flowering.

SPECIES CULTIVATED: *M. Melissophyllum*, 'Bastard Balm', creamy white and pink, May, 18 in., Europe (Br.).

Melocactus (Cactus)—*Cactaceae*. Greenhouse succulent perennial with globular, ribbed, spiny stems surmounted by a cylindrical cap. First introduced late eighteenth century.

CULTURE: Compost, two parts fibrous sandy loam, one part brick rubble, old mortar and sand. Position, well-drained pots in sunny greenhouse or window. Repot every three or four years in March. Water once a month Sept. or April; once a week afterwards. Temp., Sept. to March 50° to 55°, March to Sept. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pans of sandy soil in temp. 75° in March, keeping soil moderately moist; cuttings of stems inserted in small pots of sandy soil kept barely moist in summer; grafting on common kinds in April.

SPECIES CULTIVATED: *M. Broadwayi*, 'Turk's Cap Cactus' or 'Melon Cactus', rosy red, summer, 12 to 18 in., W. Indies.

Melon, see *Cucumis Melo*; **Water-**, see *Citrullus vulgaris*.

Menispermum (Moon Seed)—*Menispermaceae*. Hardy deciduous flowering climber. First introduced late seventeenth century.

CULTURE: Soil, ordinary rich. Position, moist, shady borders with shoots twined up walls, arbours, pergolas, or trellises. Plant, Oct. or March. Prune away weak or unhealthy shoots, Nov. to Feb.

PROPAGATION: By cuttings of young shoots inserted in sandy soil in shady position outdoors, or under hand-light in spring; division of roots, Oct. to March.

SPECIES CULTIVATED: *M. canadense*, yellow, summer, 10 to 15 ft., N. America.

Mentha (Mint)—*Labiatae*. Hardy aromatic herbs grown for oil and as garden herbs and as ornamental creeping plants.

CULTURE OF CULINARY MINTS: Soil, moist, rich. Renew beds every three years. Cut to ground level in late June and a second crop will develop. Spread thinly on trays and dry in a heat of 90° F. Force one-year-old uncropped runners by planting under glass in Oct. There are many fragrant mints grown as herbs for flavouring.

CULTURE OF MEDICINAL MINTS: Peppermint is usually grown for its valuable oil. In gardens, culture as for culinary mints, but on a commercial scale it is usual to plant on raised beds. Cut when in flower and partially dried before distilling.

CULTURE OF OTHER SPECIES: Soil, light rich. Position, partly-shaded borders. Plant, March or April. *M. Requienii* is an excellent creeping plant for covering surface of soil or paving in moist places. *M. Pulegium* var. *gibraltaria* should be wintered in a cold frame and planted out in April or May.

PROPAGATION: By summer cuttings in moist soil under a hand-light; division in Feb. or March; runners with some species.

SPECIES CULTIVATED: *M. aquatica*, 'Water Mint', mauve, summer, 2½ ft., Europe (Br.); *piperita*, 'Peppermint', purple, autumn, to 3 ft., Europe (Br.), var. *vulgaris*, 'Black Mint', has purple stems and dark foliage; *Pulegium*, 'Pennyroyal', var. *gibraltaria*, deep green, sometimes variegated leaves, 2 in., carpet bedding, W. Asia; *Requienii*, pale mauve, small creeping herb, Europe (Br.); *rotundifolia*, 'Apple Mint', 'Round-leaved Mint', robust and not very susceptible to rust, to 2 ft., Europe (Br.); *spicata* (*M. viridis* of trade lists), 'Green Pea Mint' 'Lamb Mint', 'Spearmint', purple, Aug., 2 ft., Europe (Br.).

Mentzelia—*Loasaceae*. Hardy annuals. First introduced early nineteenth century.

CULTURE: Sow seeds ½ in. deep in light, sandy soil in temp. 55° to 65° till May; place in cold frame and plant outdoors in June; or sow outdoors in sunny borders in April or May. Soil, ordinary. Position, sunny well-drained borders.

SPECIES CULTIVATED: *M. bartonioides*, yellow, summer, 1 ft., U. S.; *decapetala*, white, fragrant, Aug., 1 ft., N. America; *Lindleyi* (syn. *Bartonia aurea*), golden yellow, summer, 1 ft., California.

Menyanthes—*Gentianaceae* (or *Menyanthaceae*). Hardy perennial aquatics.

CULTURE: Soil, ordinary mud or bog. Position, shallow streams, pools, or ponds, marshes and bogs. Plant, Sept. to Nov. and March or April.

PROPAGATION: By inserting pieces of creeping stems in the mud, March to Oct.

SPECIES CULTIVATED: *M. trifoliata*, 'Buck Bean', 'Bog Bean', 'Marsh Trefoil', pinkish, fringed, fragrant, March to June, Europe (Br.).

Menziesia—*Ericaceae*. Hardy deciduous flowering shrub. First introduced early nineteenth century.

CULTURE: Soil, peaty loam. Position, sunny or partially shady shrubberies, borders or rock gardens. Plant, Nov. to Feb.

PROPAGATION: By seed sown in sandy peat in well-drained pans during Feb. in temp. 55° to 60°; cuttings of current year's growth during July in sandy soil and gentle bottom heat.

SPECIES CULTIVATED: *M. ciliicalyx*, yellowish green, purple-tipped, May to June, 3 to 6 ft., Japan; *pilosa* (syn. *M. globularis*), yellowish white, May to June, 3 to 6 ft., Eastern N. America; *purpurea*, bright rosy purple, May to June, to 3 ft., Japan. See also *Daboecia* and *Phyllodoce*.

Mercury, see *Chenopodium Bonus-Henricus*.

Merendera (Pyrenean Meadow Saffron)—*Liliaceae*. Hardy bulbous perennials with fragrant flowers. First introduced early nineteenth century.

CULTURE: Soil, light, sandy loam enriched with decayed manure or leaf-mould. Position, moist beds or rockeries, shrubbery borders, or lawns near shade of trees. Plant bulbs 3 in. deep and 3 in. apart in July or Aug. Foliage dies down in June and July and does not reappear until after plant has flowered.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in bed of fine soil outdoors in Aug. or Sept., or in pans or boxes of similar soil in cold frame at same time, transplanting seedlings 3 in. apart when two years old; division of bulbs in Aug. Seedling bulbs do not flower until four or five years old.

SPECIES CULTIVATED: *M. montana* (syn. *M. Bulbocodium*), rosy lilac, autumn, 3 in., Spain; *caucasica*, white, spring, 3 in., Caucasus; *persica*, lilac, Nov., 3 in., Persia; *sobolifera*, white, flushed pink, spring, 3 to 4 in., Asia Minor.

Mertensia—*Boraginaceae*. Hardy perennial herbs.

CULTURE: Soil, sandy peat and loam. Position, partially shady rockeries or borders. Plant, Oct. and Nov., March and April. Lift and replant in fresh soil every four or five years. *M. sibirica* will thrive in ordinary soil in partial shade.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy peat in cold frame in autumn; division of roots in Oct. or March.

SPECIES CULTIVATED: *M. brevistyla*, blue, spring, 9 in., Utah; *echioides*, blue, May to June, 6 in., Himalaya; *lanceolata* (syn. *M. coriacea*), turquoise-blue, May, 4 to 6 in., Colorado; *maritima*, blue, spring, 6 in., Europe (Br.); *moltkioides*, blue, May, 6 in., Himalaya; *primuloides*, blue, April to May, 9 in., Himalaya; *sibirica*, blue, May, 6 in., N. America; *stomatechoides*, blue, 9 in., May, California; *tibetica*, blue, spring, 6 to 9 in., Himalaya; *virginica* (syn. *M. pulmonarioides*), 'Virginian Cowslip', blue, May to June, 12 in., N. America.

Mesembryanthemum (Fig Marigold)—*Aizoaceae*. Greenhouse succulent plants. Many species formerly included here have been transferred to other genera including *Aptenia*, *Carpobrotus*, *Conophytum*, *Cryophytum*, *Delosperma*, *Drosanthemum*, *Erepsia*, *Faucaria*, *Glottiphyllum*, *Lampranthus*, *Lithops*, *Pleiospilos*, *Ruschia* and *Trichodiadema*.

CULTURE: Compost, equal parts old mortar, pounded crocks, sandy loam, well-decayed manure or leaf-mould and sand. Position, well-drained pots in sunny greenhouse or window; may be planted in sunny borders outdoors from June to Sept. Pot, March to May. Water freely April to Sept, keep nearly dry during winter. Temp., March to Oct. 55° to 65°, Oct. to March 40° to 50°.

PROPAGATION: By seed; stem-cuttings in temp. 55° to 65°, March, Sept.

SPECIES CULTIVATED: *M. alboroseum*, white, shrubby to 5 in., S. Africa; *album*, white, to 8 in., S. Africa; *bifoliatum*, rose-purple, stems branching underground, S. Africa; *paardebergense*, rose in dense cymes, decumbent or ascending to 8 in., S. Africa; *pachyphyllum*, rose-purple, branches crowned, S. Africa; *Putterillii*, rose-purple, solitary, shrubby, ascending or decumbent branches to 9 in., S. Africa; *Stanleyi*, yellow, solitary, fragrant, shrubby to 4 in., S. Africa; *verruculatum*, yellow, branches twisted or crooked to 1 ft. or more, S. Africa.

Mespilus—*Rosaceae*. Hardy, ornamental deciduous tree. Flowers, white or tinted pink, solitary; cultivated for its fruits.

CULTURE: Soil, ordinary. Position, sunny shrubberies, or as specimens on lawns. Plant, Nov. to Feb. Prune out weak and overcrowding wood in winter. Pick fruit before advent of frosts and store until over-ripe or blotted.

PROPAGATION: By seeds sown in the open during March or April; germination

slow, grafting in April on seedling stock or on pear, quince or hawthorn; budding on same stocks in July.

SPECIES CULTIVATED: *M. germanica* (syn. *Pyrus germanica*), 'Medlar', white, May and June, fruits brown, to 20 ft., Europe and Asia Minor.

Metrosideros—*Myrtaceae*. Greenhouse evergreen flowering trees. First introduced early nineteenth century.

CULTURE: Compost, peaty loam and sand. Position, large well-drained pots or borders in cool greenhouse. Plant or pot, Oct. or April. Water freely during summer months. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By cuttings of young growth during May, inserted in sandy soil under hand-light in gentle bottom heat.

SPECIES CULTIVATED: *M. lucida*, bright red, to 60 ft., New Zealand; *robusta*, dark red, May, to 100 ft., New Zealand; *scandens*, white, Aug., to 40 ft., New Zealand; *tomentosa*, dark red, July, to 70 ft., New Zealand.

Meum—*Umbelliferae*. Hardy perennial aromatic herb.

CULTURE: Soil, ordinary. Position, sunny beds, borders, banks, or rockeries. Plant, Oct., March or April. Cut down flower stems, Sept. Water freely in dry weather.

PROPAGATION: By division of the roots, Oct., Nov., March or April.

SPECIES CULTIVATED: *M. athamanticum*, 'Baldmoney', 'Spignel', white, May, 1 ft., Europe (Br.).

Mexican Cigar-flower, see *Cuphea platycentra*; **-Clover**, see *Richardia scabra*; **-Orange-flower**, see *Choisya ternata*; **-Poppy**, see *Argemone mexicana*; **-Sun-flower**, see *Tithonia rotundifolia*.

Mezeron, see *Daphne mezereum*.

Michaelmas Daisy, see *Aster*.

Michauxia—*Campanulaceae*. Hardy perennials. First introduced late eighteenth century.

CULTURE: Soil, moist, sandy loam. Position, warm, sheltered, sunny borders. Plant in Oct. or March. Best grown as biennials.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sunny position outdoors in April, transplanting seedlings into flowering position following July or Aug.; or by sowing seeds in April where plants are required to grow.

SPECIES CULTIVATED: *M. campanuloides*, white, July, 4 to 6 ft., Asia Minor; *Tchihatchewii* (syn. *M. Tchihatcheffii*), white, July to Sept., 5 to 7 ft., Asia Minor.

Michelia—*Magnoliaceae*. Rare evergreen flowering trees and shrubs, closely allied to *Magnolia*. First introduced late nineteenth century.

CULTURE: Soil, rich, deep, sandy loam. Position, border against south or west wall. Plant, March or April.

PROPAGATION: By seeds sown singly in small pots during Feb., in temp. 55° to 60°.

SPECIES CULTIVATED: *M. compressa*, pale yellow, fragrant, to 40 ft., Japan; *Doltsopa*, creamy white, April, 40 ft., Japan; *fusca*, yellowish green and purple, very fragrant, June, 15 ft., Japan.

Miconia—*Melastomaceae*. Stove evergreen plants with broad leaves, upper surface velvety green, under side reddish purple. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts fibrous peat and leaf-mould, fourth part silver sand. Position, pots in moist, shady plant stove. Pot, Feb. or March. Water moderately in winter, freely other times. Syringe foliage March to Sept. Temp., March to Sept. 75° to 85°, Sept. to March 60° to 70°.

PROPAGATION: By seeds sown in fine light compost in temp. 85° in March or April; cuttings of shoots of stems inserted in light soil in temp. 80° to 90° in spring.

SPECIES CULTIVATED: *M. flammea*, leaves green, 1 to 2 ft., Brazil; *Hookeriana*,

leaves green and white, 1 to 2 ft.; *magnifica*, leaves bronzy green, 2 to 3 ft., Mexico.

Microcachrys—*Taxaceae*. Dwarf evergreen coniferous plants.

CULTURE: Deep, well-drained loam. Cool position in sheltered rock garden or in the alpine house.

PROPAGATION: By cuttings made from well-ripened, short side growths in late summer.

SPECIES CULTIVATED: *M. tetragona*, small crimson cones, 18 to 24 in., Antipodes.

Microglossa—*Compositae*. Hardy shrubby perennial. First introduced late nineteenth century.

CULTURE: Soil, ordinary. Position, sunny borders. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in sunny position outdoors, March or April, or in sandy soil in cold frame, April; division of roots in March.

SPECIES CULTIVATED: *M. albescens*, 'Shrubby Starwort', lilac blue or bluish white, autumn, 2 to 3 ft., Himalaya.

Microlepia—*Polypodiaceae*. Stove ferns, similar to *Davallia*, and formerly included in that genus.

CULTURE: As *Davallia*.

PROPAGATION: As *Davallia*.

SPECIES CULTIVATED: *M. hirta cristata*, spreading, South Sea Is.; *platyphylla* (syn. *Davallia lonchitidea*), erect to 4 ft., India, Ceylon, Japan.

Micromeria—*Labiatae*. Half-hardy shrubby perennials.

CULTURE: Soil, ordinary. Position, sunny rockeries. Plant, Oct., Nov., March or April. Protect in winter with hand-lights.

PROPAGATION: By cuttings inserted in ordinary sandy soil under hand-light in cold frame, Sept. to Nov.

SPECIES CULTIVATED: *M. Chaminonis* (syn. *M. Douglasii*), flowers inconspicuous, fragrant leaves, trailing, N. America; *croatica*, pale rose, spring, 6 in., Croatia; *Piperella*, purple, summer, 4 to 6 in., S. Europe.

Microstylis—*Orchidaceae*. A large genus, distributed in both hemispheres. A few species are said to be epiphytic but it is usually classed as a terrestrial genus. Allied to *Malaxis* and *Liparis*, the inflorescence is terminal to a leafy stem, which may be thickened into pseudo-bulbs, then often deciduous.

CULTURE: The species given all require a warm, moist atmosphere and liberal waterings in the summer, winter temp. 65°. The deciduous species, given a decided rest, 60°. Compost, three parts of osmunda fibre to one part of sphagnum moss. A few decayed oak leaves may be added and a little loam fibre to the stronger growing. Repotting should be effected every spring. Shading is needed.

PROPAGATION: With the bulbed species, bulbs may be separated when two have been formed. The stemmed species by offsets when formed, or such species as *M. commelynaefolia*, by separating rooted pieces from the main plant.

SPECIES CULTIVATED: A selection—*M. calophylla*, greenish, leaves variously marked in green and rich brown, summer, E. Indies; *commelynaefolia*, forms a creeping mass, purplish, leaves green, small, various, Java, Sumatra; *discolor*, yellow, red marked, leaves metallic brown, green bordered, summer, Ceylon; *Josephiana*, yellow, red flecked, comparatively large, leaves olive-copper and green, spring, summer, Sikkim; *Lowii*, purple, leaves copper-brown, with a whitish central band, Borneo; *macrochila*, yellowish, lip, red purple, leaves mottled in cream, light brown and yellowish, summer, Malaya; *metallica*, yellow, rose, leaves glossy, purplish-red, summer, Borneo; *purpurea*, yellowish, purple, leaves metallic red, Ceylon, Java; *Scottii*, greenish or purplish, leaves polished, reddish, centrally passing to grey and green, flecked with red-brown and silver, near to *M. calophylla*, summer, Burma.

Mignonette, see *Reseda odorata*.

Mikania—*Compositae*. Half-hardy perennial twining climber. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, good ordinary. Position, against south or west walls, sunny arbours, or trellises. Plant, May. Lift in Oct. and store in pots in frost-proof greenhouse or frame.

INDOOR CULTURE: Compost, two parts loam, one part leaf-mould or well-decayed manure and little sand. Position, well-drained pots with shoots trained round trellises, or up rafters or in suspended baskets with shoots hanging down, in sunny greenhouse or window. Pot, Feb. or March. Water freely March to Oct., moderately afterwards. Apply stimulants occasionally May to Sept. Temp., March to Oct. 55° to 65°, Oct. to March 40° to 50°.

PROPAGATION: By cuttings of shoots inserted in sandy soil in temp. 55° to 65° in spring.

SPECIES CULTIVATED: *M. scandens*, 'German Ivy', 'Parlour Ivy', yellow and white, summer, 6 to 8 ft., Trop. America.

Milfoil, see *Achillea Millefolium*.

Milk Thistle, see *Silybum Marianum*; **-Vetch**, see *Astragalus*; **-wort**, see *Polygala*.

Milla, see *Brodiaea*.

Miltonia—*Orchidaceae*. An epiphytic genus, not large but every species with attractive flowers. Allied to *Odontoglossum*. Many beautiful hybrids have been raised with them, *Cochlioda* and *Oncidium* and with the hybrids resulting between *M. vexillaria* and its close allies *M. Phalaenopsis*, *M. Roezlii* and *M. Endresii*; a large number of garden crosses have been made, the spreading labellums of *M. Roezlii* and *vexillaria* and the variation of the latter species, with the purple colouring in the lip of *M. phalaenopsis* have produced hybrids, some with flowers of a rich crimson, all beautiful. The habit is not unlike that of *Odontoglossum*.

CULTURE: Compost, as for *Odontoglossums*. Treatment is very similar to that for *Odontoglossums* but slightly more heat should be given to obtain the best results, particularly for those hybrids derived, even remotely, from *M. Roezlii* and *M. Phalaenopsis*. A winter night temp. of 55° to 58° or 60° suits them and the species; though some may be grown with *Odontoglossums* they do not object to the increased heat. Summer temps. should be as given *Cattleyas*. Use as little pipe heat as possible, but with shading, take advantage of all sun heat. *M. vexillaria* may be potted in early spring or early in September, the other species in early spring, the hybrids in spring or into summer. Avoid winter potting. Pots or pans, well drained, may be used. A few of the species with rather hard pseudo-bulbs are the better for rather infrequent waterings in winter, but growths are often present. Use syringe freely in summer.

PROPAGATION: By division of the plants when they are repotted.

SPECIES CULTIVATED: *M. candida*, chestnut-brown, and yellow, lip partly convolute, white, autumn, Brazil; *Clowesii*, chestnut-brown, barred yellow, lip pandurate, violet-purple, white, various, Brazil; *cuneata*, chestnut-brown, tipped yellow, lip white, spring, Brazil; *Endresii* (syn. *Odontoglossum Warscewiczii*), white, rose-purple in blotches, spring, summer, Costa Rica; *flavescens* (syn. *Cyrtochilum flavescens*), yellowish white, starry, summer, Brazil; *Karwinskii* (syn. *Odontoglossum Karwinskii*), yellow, brown, lip violet-lilac, white, 3 ft. high, autumn, Mexico; *laevis* (syn. *Odontoglossum laeve*), greenish yellow, barred brown, lip rose, purplish, or white, 3 ft. high, spring, Mexico, Guatemala; *Phalaenopsis* (syn. *Odontoglossum Phalaenopsis*), white, lip white, with two radiating crimson-purple blotches, variable, summer, Colombia; *Regnelii* (syn. *M. cereola purpurea*), white, rose-flushed, lip white, rosy, rose-purple, summer, autumn, suffused rose-purple, Brazil; *Reichenheimii*, near *M. Karwinskii*, lip purple; *Roezlii*, large, sepals white, petals purple basally, lip white, autumn, Colombia; *Schroderiana*, chestnut-brown and yellow, lip rose-purple, white, summer, Costa Rica; *spectabilis*, usually solitary, large, cream-white, rose-flushed basally, lip rose-purple to whitish, variable,

spring, summer, Brazil; *vexillaria*, beautiful, variable, large, light rose to deep rose, lip often darker, spring, summer, Colombia; *Warszewiczii*, brownish-red, whitish, narrow, lip rose-purple round a brown-purple glossy disk, scape often branched, variable, spring, Colombia.

× **Miltonioda**—bigeneric hybrid between *Miltonia* and *Cochlioda*.

Mimosa—*Leguminosae* (or *Mimosaceae*). Stove perennials with feather-shaped, green, sensitive leaves. The spring flower sold as *Mimosa* is *Acacia decurrens* var. *dealbata*. First introduced early seventeenth century.

CULTURE: Compost, equal parts peat, loam and sand. **Position**—For sensitive plants (*M. pudica* and *M. sensitiva*), well-drained pots in light part of stove; *M. marginata*, similar, but with shoots trained up roof. Pot, Feb. or March. Water freely March to Sept., moderately afterwards. Temp., March to Oct. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 65° to 75°, Feb. or March; cuttings of young shoots inserted in sandy soil in temp. 65° to 75° at any time. *M. pudica* and *M. sensitiva*, though strictly perennials, are generally treated as annuals.

SPECIES CULTIVATED: *M. marginata*, pink, summer, 5 to 10 ft., Mexico; *pudica*, 'Sensitive Plant' or 'Humble Plant', rose, summer, 12 to 18 in., Brazil; *sensitiva*, purple, summer, 3 to 6 ft., Brazil.

Mimulus (Monkey-flower; Musk)—*Scrophulariaceae*. Hardy annual and perennial herbs. First introduced early nineteenth century.

CULTURE OF ANNUAL SPECIES: Sow seeds on surface of light soil and slightly cover with fine soil, place in temp. of 55° to 65°, Feb., March or April. Transplant seedlings when three leaves have formed, 1 in. apart, in shallow boxes of light soil. Place in temp. 55° until May, then transfer to cold frame. Plant outdoors, 4 in. apart, June. **Position**, shady bed or border. Soil, light, moist, well enriched with decayed manure. Mulch with compost or decayed manure. Apply stimulants occasionally, July to Sept.

CULTURE OF PERENNIAL SPECIES: (*M. cardinalis*, etc.). Soil, ordinary rich. **Position**, moist shady border. Plant, March to June. Apply stimulants occasionally, June to Oct. May be grown in pots.

PROPAGATION: By seeds sown, Feb. to May, on surface of light soil and covered with a little sand or fine soil, in temp. 55° to 60°; cuttings of young shoots inserted in light sandy soil in temp. 55° to 65° at any time; division of roots, Feb. to May, by cuttings of shoots, 2 in. long, inserted in sandy soil under bell-glass in temp. 55° to 65° in March, or in cool greenhouse or window during summer.

ANNUAL SPECIES CULTIVATED: *M. brevipes*, yellow, summer, 1½ to 2 ft., California; *Fremontii*, crimson, summer, 6 to 8 in., California.

PERENNIAL SPECIES CULTIVATED: *M. cardinalis*, 'Cardinal Monkey Flower', scarlet, summer, 1 to 2 ft., N. America; *guttatus* (syn. *M. Langsdorfii*), often known as *luteus*, yellow, spotted red, summer, 1 to 1½ ft., N. America, *luteus*, smooth leaves and botanical differences from *guttatus*, Chile; *Lewisii*, rose, July to Oct., 1 ft., N.W. America; *ringens*, violet, summer, 2 to 4 ft., N. America. See also Mazus.

Mint, see *Mentha*; **Apple-**, see *M. rotundifolia*; **Pepper-**, see *M. piperita*; **Spear-**, see *M. spicata*; **Water-**, see *M. aquatica*.

Mirabilis—*Nyctaginaceae*. Half-hardy tuberous-rooted perennials. First introduced late sixteenth century.

CULTURE: Soil, good ordinary. **Position**, sunny beds or borders. Plant tuberous roots in April, seedlings in June. Apply stimulants occasionally when plants are flowering. Lift tubers in Oct. and store in sand, peat, or cinder ashes in frost-proof place until April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in temp. 65° to 75°, Feb. or March, transferring seedlings to cold frame in May and planting out in June; division of tubers at planting time. Marvel of Peru may be treated as an annual.

SPECIES CULTIVATED: *M. hybrida*, various colours, summer, 2 ft., hybrid;

Jalapa, 'Marvel of Peru', various colours, summer, fragrant, 2 to 3 ft., Trop. America; *longiflora*, various colours, summer, fragrant, 3 ft., Mexico; *multiflora*, purple, summer, 2 to 3 ft., N.W. America.

Miscanthus—*Gramineae*. Tall hardy perennial grasses.

CULTURE: Soil, ordinary. Position, pots in cold or heated greenhouse; in groups on lawns, or sunny borders. Pot or plant, March or April. Water plants in pots moderately in winter, freely in summer. Variegated kinds best adapted for pot culture.

PROPAGATION: By division of plants in March or April.

SPECIES CULTIVATED: *M. saccharifer* (syn. *Eulalia saccharifer*), leaves with prominent white mid-rib, 6 ft., Japan; *sinensis* (syn. *Eulalia japonica*), 'Eulalia', green with white mid-rib, 6 to 10 ft., China and Japan, and vars. *gracillimus*, dwarf and narrow-leaved, *variegatus*, leaves striped yellow or white, and *zebrinus*, 'Zebra-striped Rush', leaves cross-banded yellow.

Misopates, see *Antirrhinum*.

Mistletoe, see *Viscum album*; -**Cactus**, see *Rhipsalis ceriscula*.

Mitchella—*Rubiaceae*. Hardy evergreen trailing herb. Flowers succeeded by small scarlet berries. First introduced mid-eighteenth century.

CULTURE: Soil, equal parts peat and leaf-mould. Position, shady borders or rockeries. Plant, Oct., Nov., March or April.

PROPAGATION: By division of roots in Oct. or March.

SPECIES CULTIVATED: *M. repens*, 'Chequer Berry', 'Deer Berry', 'Partridge Berry', white and purple, fragrant, summer, 3 in., N. America.

Mitella (Bishop's Cap)—*Saxifragaceae*. Hardy perennial herb. First introduced early eighteenth century.

CULTURE: Soil, sandy peat. Position, partially shaded rockeries. Plant, March.

PROPAGATION: By division of the roots, March or April.

SPECIES CULTIVATED: *M. diphylla*, 'Mitre-wort', white, spring, 6 in., N. America.

Mitraria—*Gesneriaceae*. Half-hardy evergreen flowering shrub. First introduced mid-nineteenth century.

CULTURE: Soil, two parts fibrous peat, one part sand. Position, moist, sheltered, shady borders or walls. Plant, Sept. or April.

POT CULTURE: Compost, two parts sandy peat, one part leaf-mould and sand. Pot, Sept. or Oct. Position, well-drained pots in shady, cold greenhouse or fernery. Water freely March to Oct., moderately afterwards.

PROPAGATION: By cuttings of shoots inserted in light soil under bell-glass in cold, shady frame or greenhouse, April to Sept.; division of roots in April.

SPECIES CULTIVATED: *M. coccinea*, 'Mitre Flower', scarlet, May to Aug., scandent, Chiloe Island.

Mitre Flower, see *Mitraria coccinea*; -**wort**, see *Mitella*.

Mitsumata, see *Edgeworthia papyrifera*.

Mocassin Flower, see *Cypripedium*.

Mock Orange, see *Philadelphus*; -**Plane**, see *Acer Pseudo-Platanus*.

Mocker Nut, see *Carya tomentosa*.

Mohria—*Schizaeaceae*. Greenhouse evergreen fern. Fronds, feather-shaped, green, fragrant. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part small lumps of sandstone, one part silver sand. Position, well-drained pots in shady part of greenhouse, or in beds in wardian cases in dwelling room. Pot or plant, Feb. or March. Water moderately Oct. to Feb., freely afterwards. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

PROPAGATION: By spores sown on surface of fine sandy peat in pans and placed in temp. 75° to 85° any time.

SPECIES CULTIVATED: *M. caffrorum* (syn. *M. thunifraga*), S. Africa.

Moldavian Balm, see *Dracocephalum Moldavica*.

Molinia—*Gramineae*. Hardy perennial grass. Leaves, smooth, rigid, variegated with white.

CULTURE: Soil, ordinary. Position, open or shady, as edgings to beds or borders. Plant, Oct. or March to June.

PROPAGATION: By division of roots, autumn or spring.

SPECIES CULTIVATED: *M. caerulea*, 'Indian Grass', 'Lavender Grass', 2 to 3 ft., Britain.

Molopospermum—*Umbelliferae*. Hardy perennial with fern-like graceful leaves. First introduced late sixteenth century.

CULTURE: Soil, deep rich. Position, sunny, fully exposed borders, or naturalising in wild garden. Plant in March.

PROPAGATION: By seeds sown outdoors when ripe, or in cold frame in March; also by division of roots in April.

SPECIES CULTIVATED: *M. cicutarium*, yellow and white, May, 3 to 4 ft., Central Europe.

Moltkia, see *Lithospermum*.

Molucella—*Labiatae*. Half-hardy annuals or biennials. First introduced mid-sixteenth century.

CULTURE: Soil, sandy loam. Position, sunny beds or borders. Sow seeds in pans or boxes during Feb. or March in temp. 50° to 55°. Prick out when large enough to handle and gradually harden off for planting outdoors in May.

SPECIES CULTIVATED: *M. laevis*, 'Shell-flower', white, Aug., 2 to 3 ft., W. Asia; *spinosa*, white, summer, 6 to 8 ft., S. Europe and Syria.

Momordica—*Cucurbitaceae*. Half-hardy climbing annuals. Fruit, round, oblong, or cylindrical, reddish orange; Sept. First introduced mid-sixteenth century.

INDOOR CULTURE: Compost, two parts decayed turfy soil, one part horse droppings or decomposed manure. Position, pots or beds with shoots trained up roof of sunny greenhouse. Pot or plant, April or May. Size of pots, 8 or 10 in. Water freely. Syringe twice daily. Moist atmosphere essential. Apply stimulants occasionally when fruit forms. Nip off point of shoot at first joint beyond fruit. Shade from hot sun. Temp., 65°.

OUTDOOR CULTURE: Soil, ordinary rich. Position, against sunny walls, trellises, arbours, or trailing over banks. Plant, June. Water freely in dry weather. Apply stimulants occasionally when fruit forms. Pruning of shoots not required.

PROPAGATION: By seeds sown singly in 2 in. pots filled with light soil in temp. 65° to 75° in Feb. or March.

SPECIES CULTIVATED: *M. Balsamina*, 'Balsam Apple', yellow, June, 4 ft., Tropics; *Charantia*, 'Balsam Pear', yellow, June, 4 to 6 ft., Tropics.

Monarda (Horsemint)—*Labiatae*. Hardy aromatic herbaceous perennials. First introduced mid-seventeenth century.

CULTURE: Soil, ordinary. Position, singly, or in masses in open or partially shaded borders. Plant, Oct., March or April. Top-dress with decayed manure in autumn or spring.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in partially shaded position outdoors, March or April, or in boxes of light soil in cold frame or greenhouse in March; division of roots in Feb. or March.

SPECIES CULTIVATED: *M. didyma*, 'Bee Balm', 'Oswego Tea', 'Sweet Bergamot', scarlet, summer, 1 to 2 ft., N. America; *fistulosa*, 'Wild Bergamot', purple, summer, 3 to 4 ft., N. America.

Monardella—*Labiatae*. Hardy annual and perennial fragrant-leaved herbs. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, open or partially shaded borders. Plant, Oct., March or April. Sow annual species outdoors where required to grow, in March or April. Top-dress with decayed manure in autumn or spring.

PROPAGATION: By seed sown $\frac{1}{16}$ in. deep in light soil in partially shaded position outdoors, March or April, or in boxes of light soil in cold frame or greenhouse in March; division of roots, Oct. or March.

ANNUAL SPECIES CULTIVATED: *M. candicans*, white, summer, 1 ft., N. America.

PERENNIAL SPECIES CULTIVATED: *M. macrantha*, scarlet, autumn, fragrant, 6 in., N. America.

Money Flower, see *Lunaria*; **-wort**, see *Lysimachia Nummularia*.

Monkey Flower, see *Mimulus*; **-Nut**, see *Arachis hypogaea*; **-Puzzle**, see *Araucaria araucana*.

Monkshood, see *Aconitum Napellus*.

Monochaetum—*Melastomaceae*. Greenhouse evergreen flowering shrubs.

CULTURE: Compost, two parts fibrous peat, one part light loam, one part leaf-mould, and little sand. Position, well-drained pots in light greenhouse, Sept. to June; cold, sunny frames, June to Sept. Pot March. Prune shoots moderately close immediately after flowering. Water moderately Oct. to March, freely afterwards. Syringe twice daily March to June. Apply stimulants occasionally June to Oct. Temp., Sept. to March 45° to 55°, March to June 55° to 65°.

PROPAGATION: By cuttings of shoots, 2 to 3 in. long, inserted in well-drained pots of sandy peat under bell-glass in temp. 65° to 75°, March or April. Nip off points of shoots of young plants occasionally, April to Aug., to induce bushy growth.

SPECIES CULTIVATED: *M. alpestre*, red, winter, 2 ft., Mexico; *Hartwegianum*, rose, winter, 2 ft., Peru; *Humboldtianum*, red and purple, winter, 2 ft., Caracas; *Lemoineanum*, rose and violet, winter, 2 ft.; *sericeum multiflorum*, mauve, spring, 2 ft., New Grenada.

Monsonia—*Geraniaceae*. Greenhouse ornamental herbs. First introduced mid-eighteenth century.

CULTURE: Compost, sandy loam and leaf-mould. Position, well-drained pots or pans in sunny greenhouse. Water carefully at all times. Repot March or April.

PROPAGATION: By seeds sown in light sandy soil in spring in gentle heat; cuttings inserted in sandy soil under bell-glass in spring or late summer.

SPECIES CULTIVATED: *M. lobata*, purple, red and white, spring, 1 ft., S. Africa; *speciosa*, rose and purple, spring, 9 in., S. Africa.

Monstera (Shingle Plant)—*Araceae*. Stove evergreen ornamental climbers. Leaves, large, handsome, perforated, dark green. Stems, creeping, furnished with aerial roots. Fruit, cylindrical, fragrant, pineapple-flavoured; ripe in autumn.

CULTURE: Compost, equal parts peat, leaf-mould and loam, little sand. Position, well-drained border against damp wall of stove or warm fernery. Plant, Feb. to April. Water freely March to Oct., moderately afterwards. Syringe twice daily March to Sept., once daily afterwards. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings of the stems inserted in light soil in temp. 70° to 80° any time.

SPECIES CULTIVATED: *M. acuminata* (syn. *M. tenuis* and *Gravia paradoxa*), yellow, summer, Trop. America; *deliciosa*, yellow, summer, Mexico; *pertusa* (syn. *M. Adamsonii*), yellow and white, May, Trop. America.

Montbretia—*Iridaceae*. Half-hardy cormous plants. The common Montbretia of gardens is *Crocsmia crocosmiiflora*.

CULTURE: Soil, sandy loam. Position, well-drained borders. Plant 3 in. deep and 2 in. apart in groups during March or April. Lift plants in Oct. and place in shallow boxes filled with dry soil in unheated frame or greenhouse until planting

time. In sheltered gardens corms may be left in the ground with covering of dry litter during winter. Lift, divide and replant every three years.

PROPAGATION: By offsets.

SPECIES CULTIVATED: *M. laxiflora*, cream to flesh-pink, Sept. to Nov., 6 to 18 in., Cape.

Montia—*Portulacaceae*. Soft annual herbs with rather fleshy leaves and small flowers.

CULTURE: Soil, ordinary. Position, rockery or moist, shady border. Sow seed in April.

PROPAGATION: By seed.

SPECIES CULTIVATED: *M. parviflora* (syn. *Claytonia* and *Limnia parviflora*), pink or white, summer, 2 to 3 in., N. America; *perfoliata* (syn. *Claytonia* and *Limnia perfoliata*), 'Winter Purslane', white, June, 6 in., N. America.

Moon Creeper, see *Calonyction*; **-Daisy**, see *Chrysanthemum Leucanthemum*; **-Fern**, see *Botrychium Lunaria*; **-flower**, see *Calonyction*; **-Seed**, see *Menispermum*; **-wort**, see *Botrychium* and *Lunaria*.

Moraea (Butterfly Iris)—*Iridaceae*. Half-hardy bulbous plants. First introduced late sixteenth century.

CULTURE: Soil, light, rich, sandy. Position, sunny well-drained border. Plant Sept. to Jan., placing bulbs 4 in. deep and 2 in. apart. Lift and replant bulbs annually. Mulch surface of bed in March with cow manure.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed cow manure. Pots, 4½ in. in diameter, well drained. Place five bulbs 3 in. deep in each pot in Nov. and cover with peat in cold frame or under cool greenhouse stage until growth begins. Water moderately from time bulbs begin to grow until flowers fade, then gradually cease, keeping bulbs dry till Jan. Temp., Sept. to March 40° to 50°, other times 50° to 60°.

PROPAGATION: By offsets, treated as advised for bulbs.

SPECIES CULTIVATED: *M. bicolor*, yellow and brown, summer, 2 ft., S. Africa; *glaucopsis*, white and blue-black, 1 to 2 ft., S. Africa; *iridioides*, white and yellow, 1 to 2 ft., S. Africa; *pavonia* (syn. *Iris pavonia*), 'Peacock Iris', red and blue-black, 1 to 2 ft., S. Africa; *Robinsoniana* (syn. *Iris Robinsoniana*), 'Wedding Flower', white, summer, 4 to 6 ft., Lord Howe's Island; *spathacea*, yellow and purple, 1 to 2 ft., S. Africa.

Moricanda, see *Orychophragmus*.

Morina (Whorl Flower)—*Dipsaceae*. Hardy perennial herbs. First introduced early nineteenth century.

CULTURE: Soil, deep, moist, sandy loam. Position, partially shaded, sheltered borders. Plant, Sept., Oct., March or April. Protect, Nov. to March, by covering of litter.

PROPAGATION: By seeds sown ⅛ in. deep in sandy peat and leaf-mould in cold frame in Sept. or Oct., March or April; division of roots, Sept.

SPECIES CULTIVATED: *M. Coulteriana*, yellow, June, 18 in., Himalaya; *longifolia*, white to crimson, July, 2 to 3 ft., Himalaya; *persica*, red and white, 1 to 2 ft., Himalaya.

Morisia—*Cruciferae*. Hardy dwarf alpine perennial. Introduced late nineteenth century.

CULTURE: Soil, sandy, gritty loam. Position, in the moraine or in a moist bed of stone chippings and sand. Requires full exposure to the sun. Plant in spring.

PROPAGATION: By seeds sown in sandy soil in a cold frame or by root cuttings laid in sand in spring.

SPECIES CULTIVATED: *M. monanthos* (syn. *M. hypogaea*), golden yellow, early spring, prostrate, Corsica and Sardinia.

Mormodes—*Orchidaceae*. An epiphytic genus allied to *Catasetum*. Both sexes

are present in the same flower and the pseudo-bulbs are usually more slender. Scapes produced from old and new pseudo-bulbs, flowers several, attractive, in some almost contorted, the segments spreading their margins often revolute, the lip tip often touching the column apex, which is sensitive, releasing the pollinia when touched.

CULTURE: Compost, temp., rest, etc., as for *Catasetums*.

PROPAGATION: By division of the plants as growth commences.

SPECIES CULTIVATED: A selection—*M. aromatica*, yellow, spotted red-brown, fragrant, summer, autumn, Mexico; *atropurpurea*, purple-brown or reddish-purple, autumn, Panama; *badia*, red to purplish-crimson, lip brownish, winter, Peru, var. *lutea*, yellow; *buccinator*, very variable, often yellowish suffused red-brown, lip trumpet-shaped, autumn, winter, Mexico, Colombia, Venezuela, var. *aurea*, orange-yellow; *Cartonii*, yellow, lined and spotted red, summer, autumn, Colombia; *colossus*, large, rose, yellow, lip red-dotted, spring, summer, Cent. America; *igneae*, orange or fiery red, variable, winter, Cent. America; *Lawrenceana*, large, orange-yellow, greenish, lip yellow, purple-brown, Colombia; *luxata*, yellowish, sometimes purple-spotted, summer, Mexico, var. *eburnea*, ivory white, var. *purpurata*, mauve-purple; *pardina*, yellow, spotted brown-red, summer, autumn, Mexico; *vernixia*, blackish purple, lip spotted, winter, Roraima.

Morning Glory, see *Ipomoea*.

Morus (Mulberry)—*Moraceae*. Grown for edible fruits and for foliage to feed silkworms. Flowers, greenish white, May to July. Fruit, oblong, white, red or black berries; ripe Sept. and Oct. First introduced mid-sixteenth century.

CULTURE OF MULBERRY: Specimen trees of *M. nigra* sometimes grown for edible fruits. Soil, warm, deep and well drained, moist loam. Position, sunny, sheltered from north winds, against south walls in north. Plant, Nov. to March, roots 6 in. below surface; avoid exposure and drying out and do not cut back fleshy roots as bleeding results. Pruning: thin overcrowded branches in Feb. and shorten straggling ones. With wall trees shorten to 6 in. in July young shoots growing at right angles to wall. Top-dress area of soil equal to spread of branches with well-decayed manure in Oct. or Nov. Gathering: allow to drop on to a layer of straw or lawn mowings.

CULTURE OF OTHER SPECIES: Soil, ordinary. Position, sunny sheltered shrubberies or singly on lawns. Plant, Nov. to March. Prune, as advised for mulberry.

PROPAGATION: Named vars. by cuttings 12 in. or more long, inserted half their depth in light soil in sheltered position outdoors, Sept., Oct. or March; layering shoots in Oct.; grafting in March.

SPECIES CULTIVATED: *M. alba*, 'White Mulberry', to 40 ft., China, Europe, N. America, and vars. *globosa*, compact, *pendula*, 'Weeping Mulberry', leaves used for silkworms; *nigra*, 'Black Common Mulberry', to 30 ft., W. Asia; *rubra*, 'Red' or 'American Mulberry', to 60 ft., less hardy in England than previous species, Cent. U.S.

Moschosma, see *Iboza*.

Moss Champion, see *Silene acaulis*; **-Pink**, see *Phlox subulata* and *Silene acaulis*.

Mountain Ash, see *Sorbus aucuparia*; **-Fringe**, see *Adlumia cirrhosa*; **-Holly**, see *Olearia ilicifolia*; **-Laurel**, see *Kalmia latifolia*; **-Snow**, see *Arabis albida*; **-Tobacco**, see *Arnica montana*.

Mousetail Plant, see *Arisarum*.

Mouth Root, see *Coptis*.

Mud Plantain, see *Heteranthera*.

Muehlenbeckia—*Polygonaceae*. Slightly tender deciduous shrub with wiry, tangled stems and climbing or clambering habit, flowers insignificant. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny, may be trained to walls, or allowed to stray over large rocks or tree stumps. Both species liable to curtailment by severe frost.

PROPAGATION: By Aug. cuttings in cold frame; division of rootstock in spring.

SPECIES CULTIVATED: *M. axillaris*, creeping and dwarf habit, suitable for rockery or rock walls, spreading, to 3 in., Antipodes; *complexa*, 'Wire Vine', 15 ft., New Zealand. For *M. platyclados*, see *Homalocladium*.

Mugwort, see *Artemisia vulgaris*.

Mulberry, see *Morus*.

Mulgedium, see *Lactuca*.

Mullein, see *Verbascum Thapsus*.

Musa (Banana)—*Musaceae*. Stove herbaceous perennials. Some species grown for fruit, *M. Ensete* for garden decoration in summer and *M. textilis* for fibre. First introduced late seventeenth century.

CULTURE: Compost, two parts good loam, one part well-decayed manure and one part sand. Position, pots, tubs or beds in lofty, sunny stove. Pot or plant, Jan. to April. Water copiously Feb. to Oct., about once a fortnight afterwards. Syringe twice daily Feb. to Sept., once daily Sept. to Feb. Moist atmosphere essential. Apply stimulants twice or three times weekly March to Oct. Temp., March to Oct. 70° to 85°, Oct. to March 60° to 70°.

OUTDOOR CULTURE OF M. ENSETE: Position, sunny, sheltered borders or nooks. Place in position first or second week in June, plunging pot or tub to its rim in the ground. Water copiously. Apply stimulants once a week. Lift and replace in stove in Sept. May also be planted in ordinary rich soil in June, freely watered, lifted in Sept., and roots stored close together in temp. 45° to 55° until following June.

PROPAGATION: By suckers removed from parent plant and placed in pots in temp. 75° to 85° any time of year.

SPECIES CULTIVATED: *M. Ensete*, 20 to 40 ft., Abyssinia; *nana*, 'Dwarf Banana', grown commercially in Bermuda, Canary Islands, etc., S. China; *paradisiaca*, 'Plantain', to 30 ft., Trop. Asia, var. *sapientum*, 'Banana'; *superba*, handsome species, to 14 ft., India; *textilis*, 'Manila Hemp', to 20 ft., Philippine Islands.

Muscari (Grape Hyacinth)—*Liliaceae*. Hardy bulbous flowering plants.

OUTDOOR CULTURE: Soil, deep, sandy loam. Position, sunny beds, borders, or rockeries. Plant, Aug. to Nov., in lines or masses. Depth for planting: small bulbs 2 in. deep and 1 in. apart; large bulbs 4 in. deep and 3 to 4 in. apart. Mulch with decayed manure, Nov. Lift, divide and replant every third year.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or well-decayed cow manure, and one part river sand. Pot, Aug. to Nov., placing 18 to 20 small bulbs, 1 in. apart, in a 5 in. pot; or 3 to 5 large-sized bulbs 1 in. deep in similar pots. Position, under layer of cinder ashes from time of potting till growth commences, then in cold frame, cool greenhouse, or window till past flowering, afterwards in sunny spot outdoors. Water moderately from time growth commences till foliage fades, then keep dry. Repot annually. Apply weak stimulants once or twice during flowering period.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light, sandy soil in boxes or cold frames, or outdoors in Sept.; offsets from old bulbs removed when lifting and planted as advised for full-sized bulbs. Seedlings flower when three to four years old.

SPECIES CULTIVATED: *M. botryoides*, blue, spring, 6 in., Europe, var. *album*, white; *comosum* (syn. *Leopoldia comosa*), 'Tassel Hyacinth', blue, April, 8 in., Europe, var. *monstrosum*, 'Feather Hyacinth', blue, April, 8 in.; *conicum*, April, 8 in., S. Europe; *Heldreichii*, blue, May, 8 in., Greece; *macrocarpum* (syn. *M. moschatum flavum*), yellow, April, 8 in., Aegean Islands; *Muscerinii* (syn. *M.*

moschatum), 'Musk Hyacinth', dull violet, April, 8 in., Asia Minor; *racemosum*, 'Starch Hyacinth', blue, April, 6 in., Europe; *Tubergenianum*, light blue, spring, 8 in., Persia.

Mushroom, see *Agaricus hortensis*.

Musk, see *Mimulus*.

Mussaenda—*Rubiaceae*. Stove evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and silver sand. Position, well-drained pots in light, moist stove. Pot, Feb. to April. Prune moderately after flowering. Temp., Feb. to Oct. 65° to 85°, Oct. to Feb. 55° to 65°. Water freely April to Sept., moderately Sept. to Nov. and Feb. to April, keep somewhat dry Nov. to Feb. Syringe daily Feb. to Oct.

PROPAGATION: By cuttings of young shoots in sandy soil under bell-glass in temp. 70° to 80°, May to July.

SPECIES CULTIVATED: *M. erythrophylla*, yellow, bracts crimson, winter, 1 ft., Trop. Africa; *frondosa*, yellow, Aug., 2 to 3 ft., India; *luteola*, bright yellow, autumn and winter, 5 to 6 ft., Trop. Africa; *macrophylla*, orange, May, 4 to 6 ft., Nepal.

Mustard, White, see *Brassica hirta*; **Black-**, see *B. nigra*; **Leaf-**, see *B. juncea*; **Purple-**, see *B. purpuraria*.

Mutisia—*Compositae*. Greenhouse or hardy climbing flowering shrubs. First introduced early nineteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts loam, one part leaf-mould, half-part sand. Position, pots or beds; shoots trained up rafters or round trellises. Pot or plant, Feb. or March. Prune slightly after flowering. Water freely March to Sept., moderately afterwards. Apply stimulants occasionally May to Sept. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

CULTURE OF HARDY SPECIES: Soil, ordinary rich. Position, well-drained border against sheltered, partially shaded wall. Plant, Oct., March or April. Water freely in dry weather. Protect from slugs by placing layer of fine coke or cinders round base of stems.

PROPAGATION: Greenhouse species by cuttings of half-ripened shoots inserted in sand under bell-glass in temp. 55° to 65°, May or June; hardy species by cuttings of similar shoots inserted in sand in shady, cold frame or greenhouse, April or May.

GREENHOUSE SPECIES CULTIVATED: *M. Clematis*, scarlet, summer, 20 to 30 ft., Peru; *ilicifolia*, white or rose, summer, 8 to 12 ft., Chile; *speciosa*, red, July, 10 ft., Ecuador; *subulata*, reddish-brown, summer, to 10 ft., Chile.

HARDY SPECIES CULTIVATED: *M. decurrens*, orange, summer, 6 to 10 ft., Chile.

Myosotidium—*Boraginaceae*. Hardy herbaceous perennial. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, cool, damp, sheltered border. Plant, Oct. or March. Water freely in dry weather.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in April where plants are required to grow. This plant should be disturbed as little as possible.

SPECIES CULTIVATED: *M. Hortensia* (syn. *M. nobile*), 'Chatham Island Forget-me-not', blue and white, spring, 12 to 18 in., Chatham Islands.

Myosotis (Forget-me-not)—*Boraginaceae*. Hardy perennials.

CULTURE OF M. ALPESTRIS: Soil, moist, gritty loam. Position, partially shady rockery, surrounded by small pieces of sandstone. Plant, March or April.

CULTURE OF OTHER SPECIES: Soil, ordinary. Position, as edgings to or in masses in partially shady beds or borders. Plant, Oct., Feb. or March, 4 to 6 in. apart. These are best treated as biennials—namely, raised from seed sown outdoors in April, May or June and transplanted into the beds or borders in Oct. to flower following year.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep outdoors in spring or summer;

cuttings inserted in sandy soil under hand-light in June or July; division of roots in March or Oct.

SPECIES CULTIVATED: *M. alpestris* (syn. *M. rupicola*), blue and white, fragrant, June and July, 6 to 8 in., Europe, and its many selected forms; *azorica*, blue, summer, 6 to 10 in., Azores; *cespitosa*, blue and yellow, June to July, 3 to 6 in., Europe; *dissitiflora*, sky blue, March to July, 8 to 10 in., Alps, var. *alba*, white; *scorpioides* (syn. *M. palustris*), sky blue, May to July, 6 to 12 in., Britain, var. *semperflorens*, long flowering; *sylvatica*, blue and yellow, summer, 1 to 2 ft., Britain.

Myrica—*Myricaceae*. Hardy deciduous and evergreen shrubs with small catkin flowers of no beauty. Leaves, lance-shaped, green, highly fragrant.

CULTURE: Soil, moist, sandy peat. Position, open, sheltered borders. Plant, Oct. to March. Prune deciduous species, Nov. to Feb.; evergreen species, April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in ordinary soil in sheltered position outdoors in autumn; cuttings inserted in sandy soil in sheltered position outdoors, Sept. or Oct.; layering shoots in Sept. or Oct.; division of plants, Oct. to March.

SPECIES CULTIVATED: *M. californica*, evergreen to 15 ft., rather tender, waxy white berries, California; *cerifera*, 'Candle-berry' or 'Wax Myrtle', brown, May, 20 to 40 ft., America; *Gale*, 'Sweet Gale', brown, May, 4 ft., N. Europe (Br.). See also *Comptonia*.

Myricaria (False Tamarisk)—*Tamaricaceae*. Hardy deciduous flowering shrub. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary sandy. Position, open, sunny borders or banks. Plant, Oct. to March. Prune into shape, Nov. to Feb.

PROPAGATION: By cuttings of firm young shoots inserted in sandy soil outdoors, Oct., Nov.

SPECIES CULTIVATED: *M. germanica* (syn. *Tamarix germanica*), pink, July, 6 to 8 ft., Europe.

Myriophyllum (Water Milfoil)—*Haloragidaceae*. Pretty feathery submerged and shallow-water aquatics much used in ponds and aquariums.

CULTURE: Soil, pond or aquarium compost. Plant, spring and summer in pans, dropping these gently into the water or planting individual specimens in the aquarium. Waterside kinds, plant at the pond edges.

PROPAGATION: By slips broken from parent plant inserted in pans containing a little loam and several inches of water.

SPECIES CULTIVATED: *M. gracile*, Australia; *heterophyllum*, bronze-green, N. America; *hippuroides*, hair-like, S. and N. America; *proserpinacoides*, 'Parrot's Feather', grow at pond margin, feathery stems trail over sides of pool or fountain, hardy, S. Africa; *pinnatum*, Trop. America; *verticillatum*, Britain.

Myrrhis (Myrrh)—*Umbelliferae*. Hardy perennial aromatic herb. Leaves finely divided, fern-like, fragrant.

CULTURE: Soil, ordinary. Position, open, sunny borders. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in ordinary soil outdoors, Sept. or April; division of roots, Oct. or March.

SPECIES CULTIVATED: *M. odorata*, 'Sweet Cicely', white, May, 3 ft., Europe (Br.).

Myristica (Nutmeg)—*Myristicaceae*. Stove or warm greenhouse evergreen tree. The seed furnishes the nutmeg of commerce and commercial mace is obtained from the aril surrounding the seed. First introduced late eighteenth century.

CULTURE: Compost, fibrous loam, leaf-mould, peat and sand. Position, large pots or planted out in prepared border in warm greenhouse. Temp., March to Oct. 65° to 75°, October to March 55° to 65°.

PROPAGATION: By cuttings of ripened shoots inserted in sand under bell-glass or in propagating case over bottom heat.

SPECIES CULTIVATED: *M. fragrans*, pale yellow, June, to 30 ft., Moluccas.

Myrtus (Myrtle)—*Myrtaceae*. Greenhouse and slightly tender evergreen shrubs.

Hardy in open extreme south-west, requiring wall protection in the south, leaves fragrant when crushed, flowers also fragrant.

CULTIVATION: Soil, ordinary, well drained. Position, very sheltered borders, or against south walls in southern counties. May be grown in pots or tubs in conservatories and are sometimes formally trained as pyramids or standards.

PROPAGATION: cuttings in sandy soil with gentle bottom heat, Aug. May be clipped to formal shapes, May to July. Prune to shape after flowering.

SPECIES CULTIVATED: *M. bullata* (syn. *M. communis*), 'Common Myrtle', to 10 ft., white, fragrant, summer, W. Asia, with vars. *microphylla*, smaller leaved, *tarentina*, a smaller-growing dainty form, and *variegata*; *Ralphii*, 8 to 10 ft., New Zealand; *Ugni* (syn. *Eugenia Ugni*), to 10 ft., white, fragrant, summer, berries which are pleasant to eat, freely borne, Chile.

Naegelia, see *Smithiantha*.

Nailwort, see *Paronychia*.

Nancy-Pretty, None-so-Pretty, see *Saxifraga umbrosa*.

Nandina—*Berberidaceae*. Half-hardy evergreen flowering shrub. First introduced early nineteenth century.

CULTURE: Soil, peat and loam. Position, sheltered, moderately moist beds or borders in mild districts only. Plant in May or Sept.

PROPAGATION: By cuttings inserted in sandy peat in gentle bottom heat in summer. Rooting is slow.

SPECIES CULTIVATED: *N. domestica*, 'Heavenly Bamboo', white, summer, 6 to 8 ft., leaves assume reddish tint in autumn, red berries sometimes borne, China.

Narcissus—*Amaryllidaceae*. Hardy spring flowering bulbs.

R.H.S. CLASSIFICATION: Division I—Trumpet. Distinguishing characters, one flower to a stem; trumpet or corona as long as or longer than the perianth segments: (a) perianth coloured; corona coloured, not paler than the perianth: (b) perianth white; corona coloured: (c) perianth white; corona white, not paler than the perianth: (d) any colour combination not falling into (a), (b) or (c).

Division II—Large-cupped. Distinguishing characters, one flower to a stem, cup or corona more than one-third, but less than equal to the length of the perianth segments: (a) perianth coloured; corona coloured but not paler than the perianth: (b) perianth white; corona coloured: (c) perianth white; corona white, not paler than the perianth: (d) any colour combination not falling into (a), (b) or (c).

Division III—Small-cupped. Distinguishing characters, one flower to a stem; cup or corona not more than one-third the length of the perianth segments: (a) perianth coloured; corona coloured, not paler than the perianth: (b) perianth white; corona coloured: (c) perianth white; corona white, not paler than the perianth: (d) any colour combination not falling into (a), (b) or (c).

Division IV—Double. Distinguishing character, double flowers.

Division V—Triandrus. Distinguishing characters, characteristics of *Narcissus triandrus* clearly evident: (a) cup or corona not less than two-thirds the length of the perianth segments: (b) cup or corona less than two-thirds the length of the perianth segments.

Division VI—Cyclamineus. Distinguishing characters, characteristics of *Narcissus cyclamineus* clearly evident: (a) cup or corona not less than two-thirds the length of the perianth segments; (b) cup or corona less than two-thirds the length of the perianth segments.

Division VII—Jonquilla. Distinguishing characters, characteristics of any of the *Narcissus Jonquilla* group clearly evident: (a) cup or corona not less than two-thirds the length of the perianth segments; (b) cup or corona less than two-thirds the length of the perianth segments.

Division VIII—Tazetta. Distinguishing characters, characteristics of any of the *Narcissus Tazetta* group clearly evident.

Division IX—Poeticus. Distinguishing characters, characteristics of the *Narcissus poeticus* group without admixture of any other.

Division X—Species, etc. All species and wild, or reputedly wild, forms and hybrids.

Division XI—Miscellaneous. All narcissi not falling into any of the foregoing divisions.

OUTDOOR CULTURE: Soil, ordinary for common kinds; sandy loam for *N. bulbocodium* and vars.; peaty soil for *N. cyclamineus*. No animal manure must be applied. Position, partially or quite shady beds or borders facing north or north-east for robust kinds; rockeries sheltered from north or north-east winds for choice or dwarf kinds. Plant, Aug. to Nov. Depth for planting robust kinds, 3 to 4 in. on heavy soils; 6 in. on light soils. Distance apart, 4 to 6 in. Rock garden narcissus, 2 to 3 in. deep and the same apart. Lift *N. Bulbocodium* in July and re-plant in Oct.; other kinds every three or four years in July. Do not remove foliage until quite dead. Manures: 4 oz. of basic slag or 4 oz. of bonemeal for heavy soils; $\frac{1}{2}$ oz. of sulphate of potash for sandy soils. Apply above quantities per square yard before planting.

CULTURE IN TURF: Make holes 2 to 3 in. wide, 3 in. deep. Place one bulb in each and cover with soil and turf. Plant, Aug. to Oct. Grass must not be cut until leaves turn yellow.

INDOOR CULTURE: Compost, two parts fibrous loam, one part well-decayed manure or leaf-mould, one part sand. Pot, Aug. to Nov., placing 3 large, 6 medium-sized, or 12 small bulbs in a 5 in. pot. Depth for planting: Allow apex to just appear above surface of soil. Position, under cinder ashes outdoors or in frame until growth begins, then remove to greenhouse or window. Water only when growth commences, moderately afterwards. Apply weak stimulants when flowers appear. Temp. for forcing, 55° to 65°. After flowering, plant bulbs, except those of *N. Bulbocodium* and *N. cyclamineus*, outdoors. Keep soil of the latter dry after flowering.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in pans of sandy loam in cold frame in autumn, transplanting seedlings following year 1 in. apart in bed of sandy soil in shady position outdoors; by offsets, removed from old bulbs in July or Aug. and replanted at once as advised for parent bulbs. Seedling bulbs flower when three to eight years old.

SPECIES CULTIVATED: *N. biflorus*, white and yellow, May, 1 ft., Europe; *Bulbocodium* (syn. *N. cantabricus*), 'Hoop-petticoat Daffodil', yellow, April, 6 in., S. Europe, and vars. *citrinus*, lemon-yellow, *Graellsii*, whitish, *monophyllus*, white; *cyclamineus*, lemon and yellow, spring, 1 ft., Portugal; *gracilis*, yellow, April, 1 ft., S. France; *incomparabilis*, 'Chalice Cup Narcissus', yellow, April, 1 ft., Europe; *Jonquilla*, 'Jonquil', yellow, April, 9 in., S. Europe and Algeria; *juncifolius*, yellow, spring, 6 to 8 in., S. Europe; *maximus*, yellow, April, 1 ft., Europe; *minimus*, 'Pygmy Daffodil', sulphur yellow, spring, 4 in., Europe; *moschatus*, 'Musk Daffodil', white, April, 1 ft., Pyrenees; *odorus*, 'Campernelle', yellow, May, 1 ft., France and Spain; *poetaz*, 'Poetaz Narcissus', like *N. Tazetta* but larger and more fragrant, hybrid; *poeticus*, 'Poet's Narcissus', 'Pheasant Eye Narcissus', white, May, 1 ft., France to Greece, var. *ornatus*, early flowering form; *Pseudo-Narcissus*, 'Daffodil', 'Trumpet Narcissus', 'Lent Lily', yellow, March, 1 ft., Europe (Br.), var. *bicolor*, yellow and white; *serotinus*, white and yellow, Sept. to Oct., 1 ft., S. Europe; *Tazetta*, 'Polyanthus Narcissus', white and yellow, March, 1 ft., Canary Isles to Japan, var. *orientalis*, 'Chinese Sacred Lily'; *triandrus*, 'Angel's Tears', white, April, 6 to 9 in., Spain, var. *calathinus*, pale yellow.

Nard, see *Valeriana celtica*.

Narthecium (Bog Asphodel)—*Liliaceae*. Hardy herbaceous perennial.

CULTURE: Soil, ordinary. Position, moist beds, borders, or margins of ponds. Soil, ordinary, or boggy peat. Plant, Oct. or March.

PROPAGATION: By seeds sown in March or April where plants are required to grow; division of roots in Oct. or March.

SPECIES CULTIVATED: *N. ossifragum*, yellow, July, 6 in., Europe (Br.).

Nasturtium (Watercress)—*Cruciferae*. Hardy perennial aquatic herb. Leaves, green or brown; largely used for salads. The annual known in gardens as *Nasturtium* is *Tropaeolum majus*.

CULTURE IN BEDS IN WATER: Soil, ordinary. Position, open. Dimensions of beds, 3 to 4 ft. wide; 3 to 6 in. deep; no limit as to length. Depth of soil, $1\frac{1}{2}$ to 3 in. Depth of water, $1\frac{1}{2}$ in. when first planted; 3 in. when growing freely; 6 in. in winter. Water must flow through beds, not be stagnant. Plant, May and June for gathering in Aug. to Feb.; Sept. to Nov. for gathering in Feb. to May. Replant beds twice annually. Distance for planting, 6 in. apart in rows, 2 ft. between rows. Soil must be removed each planting. Gather the tops once a week; cut, not break, them off.

CULTURE IN PANS: Soil, ordinary. Position, tubs or tanks of water in open air or under glass. Sow seeds $\frac{1}{8}$ in. deep in March or Sept. and partly immerse pan in water; wholly when seedlings appear. Insert cuttings 2 to 3 in. apart in spring or autumn; partly immerse at first, wholly after.

CULTURE IN TRENCHES: Soil, ordinary. Position, sunny. Dig trench 2 ft. wide, 1 ft. deep. Put 6 in. decayed manure in, and 3 in. of soil on this. Sow seeds thinly $\frac{1}{8}$ in. deep in April and Aug. Keep well watered. Cress sown in April gather June to Sept.; in Aug., Nov. to May.

PROPAGATION: For beds by seeds sown in a shady border in April, and kept moist; division of the plants in May or Aug.

SPECIES CULTIVATED: *N. officinale* (syn. *Rorippa Nasturtium-aquaticum*), white, June, Britain.

Navelwort, see *Omphalodes* and *Umbilicus*.

Nectarine, see *Prunus Persica* var. *nectarina*.

Needle Furze, see *Genista anglica*.

Nectaroscordum, see *Allium*.

Neillia (Nine Bark)—*Rosaceae*. Hardy deciduous flowering shrubs. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, open, sunny shrubberies or banks. Plant, Oct. to March. Prune moderately after blooming.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in sheltered position outdoors, autumn or spring; cuttings of half-ripened shoots, 2 to 3 in. long, inserted in sand under bell-glass during July and Aug. which strike readily; rooted offsets.

SPECIES CULTIVATED: *N. longiracemosa*, rose pink, July, 6 to 8 ft., W. China; *sinensis*, white, June, 6 ft., Cent. China; *thibetica*, pink, July, 6 ft., W. China; *thyrsiflora*, white, July, 3 ft., Sikkim.

Nelumbium, see *Nelumbo*.

Nelumbo (Lotus)—*Nymphaeaceae*. Greenhouse aquatic rhizomatous-rooted perennials with fragrant flowers and bluish-green, shield-shaped leaves 1 to 2 ft. in diameter. *N. nucifera* is one of the two plants known as the 'Lotus of the Nile', the other being *Nymphaea caerulea*. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part well-decayed manure. Position, tanks or tubs of water heated to a temp. of 60° to 65°. Plant rhizomes 1 to 2 in. below surface of water in Feb. or March. Temp., March to Oct. 55° to 60°, Oct. to March 45° to 55°. Draw off water from tank in Oct. and keep rhizomes dry till Feb.

PROPAGATION: By seeds sown in sandy soil, 2 to 3 in. below surface of water heated to temp. 60° to 70° any time of year, file seeds to facilitate germination; division of rhizomes in Feb.

SPECIES CULTIVATED: *N. nucifera* (syns. *Nelumbium speciosum*, *N. Nelumbo*),

white and rose, Trop. Asia, and many vars. including double white, white edged red or green, rose, double rose and pygmy forms; *pentapetala* (syn. *N. lutea*), 'Sacred Bean', sulphur-yellow, slow to establish itself (5 to 6 years), S. United States.

Nemastylis—*Iridaceae*. Half-hardy flowering bulbs. First introduced mid-nineteenth century.

OUTDOOR CULTURE: Soil, light, rich, sandy. Position, sunny well-drained border. Plant, Jan., placing bulbs 4 in. deep and 2 in. apart. Lift and replant bulbs annually. Mulch surface of bed in March with cow manure.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed cow manure. Pots, 4½ in. in diameter, well drained. Place five bulbs, 3 in. deep, in each pot in Nov. and cover with peat in cold frame or under cool greenhouse stage until growth commences. Water moderately from time bulbs begin to grow until flowers fade, then gradually cease, keeping bulbs dry till Jan. Temp., Sept. to Mar. 40° to 50°, other times 50° to 60°.

PROPAGATION: By offsets, treated as advised for bulbs.

SPECIES CULTIVATED: *N. geminiflora*, purplish blue, May to June, 2 ft., California.

Nemesia—*Scrophulariaceae*. Half-hardy annuals. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, sunny beds or well-drained borders.

PROPAGATION: By seeds sown in April ½ in. deep in well-drained pots or pans filled with light fibrous loam and little wood ashes. Place in temp. 55°, transplant seedlings when they have formed three leaves 1 in. apart in well-drained pots, placing in temp. of 55°, and planting into flowering position outdoors in June, or repot into 6 in. pots for flowering in the greenhouse; also seeds sown in May ½ in. deep in patches outdoors where plants are required to flower, afterwards thinning seedlings to at least 4 in. apart.

SPECIES CULTIVATED: *N. strumosa*, various colours, summer, 1 ft., S. Africa, and many dwarf vars. are now available; *versicolor*, many colours, summer, 8 to 12 in., S. Africa. There are several hybrid races to be found in trade lists.

Nemophila—*Hydrophyllaceae*. Hardy spreading annuals. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, ordinary. Position, in masses or in lines as edgings to sunny beds or borders. Sow seeds ½ in. deep in March or April for flowering in summer; in Aug. or Sept. for flowering in spring. Thin seedlings to 3 in. apart when ½ in. high.

POT CULTURE: Compost, any well-drained soil. Sow seeds thinly, slightly covering with fine soil, and place pots in cool, shady frame or window. Water moderately at first, freely when seedlings appear. Apply weak stimulants once or twice weekly when plants begin to flower. Position when in flower, cold, sunny greenhouse, window or frame.

SPECIES CULTIVATED: *N. maculata*, white and purple, summer, 6 in., California; *Menziesii* (syn. *N. insignis*), 'Baby Blue-eyes', white or blue, summer, spreading, California.

Neobenthamia—*Orchidaceae*. A terrestrial orchid. The one species has slender stems, often 6 ft. high and branched, clothed with leaves, flowers in terminal heads.

CULTURE: Compost, two parts osmunda fibre, one part loam fibre, one part sphagnum moss, well-drained pots. A warm moist atmosphere and waterings throughout the year. Winter temp. 65°, higher in summer. Shading required.

PROPAGATION: By division of plants or rooted branches.

SPECIES CULTIVATED: *N. gracilis*, white, lip rose-spotted, spring to summer, Zanzibar, E. Africa.

Neomarica—*Iridaceae*. Stove herbaceous perennials, formerly known as Marica. First introduced late eighteenth century.

CULTURE: Compost, equal parts peat, leaf-mould and sand. Position, well-drained pots in light part of stove. Pot, Feb. or March. Water freely March to

Oct., keep dry Nov. to Feb. Apply weak stimulants occasionally when in flower. Temp., 65° to 75° March to Sept., Sept. to March 55° to 65°.

PROPAGATION: By division of rhizomatous roots, Feb. or March.

SPECIES CULTIVATED: *N. gracilis*, bluish-white, spotted with reddish-brown, summer, 2 ft., Trop. America; *Northiana*, white, yellow, and red, summer, 3 to 4 ft., Trop. America.

Neomoorea—*Orchidaceae*. Only one species is known in this genus, a large-growing epiphyte. The stout pseudo-bulbs carry large leaves up to 3 ft. long. Scapes with the young growth, flowers many. Originally known as *Moorea*.

CULTURE: Compost, three parts osmunda fibre, one part sphagnum moss, with loam fibre, one part, for strong plants. Pots well drained. Position, shade from bright sunlight. Winter temp. 60° to 65°, water then given infrequently. Summer 70° to 80°, water freely. A moist atmosphere throughout the year.

PROPAGATION: By division of plants in spring, or by separating sound back bulbs and treating as for *Cymbidiums* but in heat.

SPECIES CULTIVATED: *N. irrorata* (syns. *Moorea irrorata*, *Neomoorea Wallisii*), many, cup-shaped, orange-brown, yellowish, white, lip 3-lobed, barred purple-brown, mid-lobe spotted red, spring, Colombia.

Nepenthes (Pitcher-plant)—*Nepenthaceae*. Stove evergreen sub-shrubby perennials. Flowers, greenish, dioecious, insignificant. Leaves, oblong or lance-shaped, variously mottled with red, brown and crimson, terminating in a pitcher-like appendage. First introduced late eighteenth century.

CULTURE: Compost, two parts good brown fibrous peat, one part sphagnum moss. Position, in baskets suspended from roof in shady part of stove. Plant, Feb. or March. Temp., March to Sept. 70° to 85°, Sept. to March 65° to 75°. Water copiously March to Sept., moderately afterwards. Syringe twice daily all the year round. Moist atmosphere very essential. Shade from sun.

PROPAGATION: By seeds sown on surface of mixture of fibrous peat and sphagnum moss in well-drained pan covered with bell-glass and placed in a moist frame heated to temp. of 80° to 85°; cuttings of one-year-old shoots inserted singly in small pots plunged in bottom heat of 85° any time.

SPECIES CULTIVATED: *N. albomarginata*, green and white, Singapore; *atrosanguinea*, pale green and reddish-purple, hybrid; *Dicksoniana*, green marked with purple, hybrid; *Dominii*, mottled green and purple, hybrid; *Henryana*, red, mottled, hybrid; *Hookeriana*, pale green and red, Borneo; *intermedia*, green spotted with purple, hybrid; *Mastersiana*, crimson with purple spots, hybrid; *maxima* (syn. *N. Curtisii*), green, crimson, and purple, Borneo; *mirabilis* (syn. *N. Rafflesiana*), green, red, and brown, India; *sanguinea*, blood-red, Malaya; *Sedenii*, pitchers contracted in middle, hybrid; *Veitchii*, green, Borneo; *ventricosa*, green, brown, and crimson, Philippines.

Nepeta—*Labiatae*. Hardy herbaceous perennials with toothed, more or less heart-shaped leaves, mostly aromatic. The plant most commonly cultivated in gardens as *N. Mussinii* is in reality a hybrid, *N. Faassenii*, the flowers are on longer spikes than in the true species.

CULTURE: Soil, ordinary. Position, sunny beds, borders or rockeries. Plant, Oct. to March.

PROPAGATION: By seeds sown where plants are to grow, March to May; division of roots, Oct. to March.

SPECIES CULTIVATED: *N. Cataria*, 'Catmint', whitish to pale purple, summer, to 3 ft., Europe (Br.); *Faassenii* (syn. *N. pseudomussinii*), lavender-blue, summer, to 2 ft., hybrid; *Mussinii*, lavender-blue, summer, 18 in., Caucasus, Persia; *nervosa*, pale blue, summer, to 2 ft., Himalaya. See also *Glechoma*.

Nephrodium, see *Dryopteris*.

Nephrolepis—*Polypodiaceae*. Stove evergreen ferns. Fronds linear, narrow, once divided, plain or crested. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand, two parts lumpy

peat. Position, in baskets suspended from roof, or in well-drained pots or beds in shady part of stove. Pot or plant, Feb. or March. Water moderately Oct. to March, freely afterwards. Temp., Sept. to March 55° to 60°, March to Sept. 65° to 75°. *N. cordifolia* will thrive in warm greenhouse.

PROPAGATION: By spores sown on surface of pans of sandy peat under bell-glass and placed in temp. 75° to 85° any time; division of plants, Feb. to April; or by pegging down creeping stems bearing young plants and removing when rooted.

SPECIES CULTIVATED: *N. acuminata* (syn. *N. davallioides*), 2 to 3 ft., Java; *biserrata* (syn. *N. acuta*), 2 to 4 ft., Tropics; *cordifolia* (syn. *N. tuberosa*), 1 to 2 ft. Tropics and Subtropics; *Duffii*, 1 ft., Australia; *exaltata*, 'Ladder Fern', 2 to 3 ft., Tropics, and many fine crested and plumose vars.; *hirsutula* (syn. *N. refescens*), 2 to 3 ft., Tropics.

Nephrophyllidium, see *Fauria*.

Nerine—*Amaryllidaceae*. Greenhouse bulbous plants, natives of S. Africa, which flower from June well on into the autumn. First introduced late seventeenth century.

CULTURE: Compost, two parts sandy loam, one part well-decayed cow manure or leaf-mould, one part coarse sand. Pot, Aug. to Nov., placing one bulb half its depth in a 4½ in. pot or three in a 6 in. pot; good drainage essential. Position, light, cool greenhouse, Sept. to May; cold frame or sunny spot outdoors, May to Sept. Water moderately Sept. to May, or as soon as flower spikes show; keep quite dry May to Sept. Apply stimulants occasionally during growth. Top-dress annually with equal parts sandy loam, decayed cow manure, and sand, in Aug. Repotting only necessary every three or four years. Season of growth, Sept. to May; season of rest, May to Sept.

CULTURE OUTDOORS: Soil, light sandy, enriched with decayed cow manure. Position, sunny well-drained borders at base of south wall. Plant, Aug. to Nov., 2 to 3 in. deep. Protect, Nov. to April, with covering of dry litter. Top-dress annually in Aug. with leaf-mould or decayed cow manure. Lift and replant every four or five years.

PROPAGATION: By offsets, removed when repotting and treated as old bulbs.

SPECIES CULTIVATED: *N. Bowdenii*, pink, 1½ ft.; *curvifolia*, scarlet, 1 ft., var. *Fothergillii*, deep scarlet; *filifolia*, red, 1 ft.; *flexuosa*, pink, 2 ft.; *humilis*, purplish rose, 18 in.; *sarniensis*, 'Guernsey Lily', salmon, 2 ft., and vars. *corusca*, orange-scarlet, 1 ft., *Plantii*, crimson, *rosea*, rose, and numerous hybrids. See also *Lycoris*.

Nerium—*Apocynaceae*. Greenhouse evergreen flowering shrubs. First introduced late sixteenth century.

CULTURE: Compost, two parts sandy loam, one part well-decomposed manure, one part leaf-mould, and one part sand. Position, pots, tubs, or well-drained beds in light, sunny greenhouse or window; place pot or tub plants outdoors, June to Sept. Pot or plant, Feb. or March. Prune immediately after flowering, or in Oct. shortening shoots of previous year's growth to within 3 or 4 in. of their base. Temp., Sept. to March 45° to 55°, March to June 55° to 65°. Water copiously March to Sept., moderately Sept. to Nov., keep nearly dry Nov. to March. Apply stimulants once or twice weekly May to Sept. Remove young shoots that issue from base of flower trusses as soon as they appear. No shade required. Syringe twice daily March to June.

PROPAGATION: By cuttings of firm young shoots, 3 to 6 in. long, inserted singly in 2 in. pots in a compost of equal parts peat, loam, leaf-mould, and sand, placed under bell-glass in temp. 60° to 70°, spring or summer.

SPECIES CULTIVATED: *N. Oleander*, 'Oleander' or 'Rose Bay', white, red, or purple, summer, to 20 ft., Orient, and numerous vars.; *indicum* (syn. *N. odorum*), rose-pink or white, sweet-scented, June to Aug., 6 to 8 ft., Persia and Japan.

Nertera—*Rubiaceae*. Greenhouse and half-hardy creeping perennial herb with orange berries. First introduced mid-nineteenth century.

INDOOR CULTURE: Compost, two parts sandy loam, one part leaf-mould and

sand. Position, small well-drained pots or pans in shady part of greenhouse. Pot, Feb. or March. Water freely March to Sept., moderately afterwards. Temp., March to Oct. 50° to 60°, Oct. to March 40° to 50°.

OUTDOOR CULTURE: Soil, ordinary, light rich. Position, moist, sheltered ledges of shady rockery. Plant, March or April. Water in dry weather. Protect in severe weather with bell- or hand-glass.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light, sandy soil in temp. 55° to 65°, March or April; division of plants in March or April.

SPECIES CULTIVATED: *N. granadensis* (syn. *N. depressa*), 'Bead Plant', 'Fruiting Duckweed', 1 in., flowers green, S. America, Australasia.

Neviusia—*Rosaceae*. Hardy deciduous flowering shrub. First introduced late nineteenth century.

CULTURE: Soil, good ordinary. Position, sunny, sheltered shrubbery. Plant in autumn.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy soil in cold frame in summer; also by layering in autumn.

SPECIES CULTIVATED: *N. alabamensis*, 'Alabama Snow Wreath', white, May, 6 ft., Alabama.

New Jersey Tea-Plant, see *Ceanothus americanus*.

New Zealand Broom, see *Notospartium*; **-Bur**, see *Acaena microphylla*;

-Daisy Bush, see *Olearia*; **-Flax**, see *Phormium Tenax*; **-Glory Pea**, see

Clanthus Dampieri; **-Holly**, see *Olearia ilicifolia*; **-Kowhai**, see *Sophora tetraltera*;

-Mountain Buttercup, see *Ranunculus Lyallii*; **-Palm**, see *Rhopalostylis sapida*;

-Penwiper Plant, see *Notothlaspi rosulatum*; **-Spinach**, see *Tetragonia expansa*;

-Tree Fern, see *Dicksonia squarrosa*.

Nicandra—*Solanaceae*. Hardy annual. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, sunny, open borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pots or boxes of light soil in temp. 55° in March, transplanting seedlings 3 ft. apart outdoors in May; or by sowing seed in sunny position outdoors in April, transplanting seedlings in June.

SPECIES CULTIVATED: *N. Physalodes*, 'Apple of Peru', blue and white, summer, 18 in. to 2 ft., Peru.

Nicotiana (Tobacco Plant)—*Solanaceae*. Half-hardy annuals. *N. Tabacum* is the tobacco of commerce. First introduced mid-sixteenth century.

POT CULTURE: Compost, two parts loam, one part leaf-mould or decayed manure, and one part sand. Position, sunny or shady greenhouse or window. Water freely when in full growth, moderately at other times. Temp., March to Sept. 55° to 60°, Sept. to March 40° to 50°.

OUTDOOR CULTURE: Soil, ordinary. Position, sunny beds or borders. Plant in June in groups of three or six. Protect *N. alba* in winter with covering of cinder ashes, tan, or decayed manure. Will only survive winter in well-drained soils.

CULTURE OF TOBACCO PLANT: Soil, ordinary. Position, sunny beds or borders. Plant, June. Gather leaves of *N. Tabacum* in Sept. for drying. Water freely in dry weather.

PROPAGATION: By seeds sown on the surface of fine light soil in a shallow box or pan in shade, in a temp. of 55° to 60°, in March or April.

SPECIES CULTIVATED: *N. alata*, var. *grandiflora* (syn. *N. affinis*), 'Sweet-scented Tobacco', white, fragrant, summer, 3 to 5 ft., strictly a perennial, Brazil; *Sanderae*, red, pink, carmine, etc., summer, 2 to 3 ft., hybrid; *suaveolens*, white, summer, 2 ft., S. America; *sylvestris*, white, summer, 3 to 4 ft., Argentina; *Tabacum*, 'Tobacco Plant', rose, summer, 4 ft., S. America, var. *macrophylla* (syn. *N. macrophylla*), red, rose, or purple, summer; *tomentosa* (syn. *N. colosseae*), pale green and yellow, tinged red, 10 to 20 ft., S. America.

Nidularium—*Brome iaceae*. Stove plants with green, red or crimson bracts, and leaves in dense basal rosette. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous loam, rough peat, leaf-mould and silver sand. Position, well-drained pots in light, moist part of stove. Pot, Feb. or March. Water moderately in winter, freely at other times. Temp., March to Sept. 70° to 80°, Sept. to March 65° to 75°.

PROPAGATION: By largish offshoots inserted singly in small pots of sandy peat in temp. of 85°, Feb. or April.

SPECIES CULTIVATED: *N. fulgens*, white and violet, leaves spotted dark green, 9 to 12 in., Brazil; *Innocentii*, white, leaves tinted brown or red, Brazil; *purpureum*, red, leaves flushed purple-brown, Brazil; *striatum*, white, to 1 ft., Brazil. See also *Canistrum* and *Aregelia*.

Nierembergia (Cup-flower)—*Solanaceae*. Hardy and half-hardy creeping perennial herbs. First introduced early nineteenth century.

CULTURE OF HARDY SPECIES: Soil, equal parts sandy loam and leaf-mould. Position, sunny or moist border or ledges of rockery. Plant, Oct., March or April. Water freely in dry weather. Top-dress annually in March with decayed cow manure. Protect in very severe weather with covering of litter.

CULTURE OF HALF-HARDY SPECIES: Compost, two parts sandy loam, one part well-decomposed cow manure, and one part sand. Position, well-drained pots or pans in shady part of greenhouse or cold frame all the year round, or outdoors in shady spot, May to Oct. Pot, Feb. or March. Water freely March to Sept., moderately afterwards.

PROPAGATION: By seeds sown in light, sandy soil in temp. 55° to 65° Nov. to April; cuttings inserted in sandy soil under bell-glass in shady part of cool greenhouse in Aug., transferring when well rooted singly into 2 in. pots and placing in light, airy position in greenhouse or window.

HARDY SPECIES CULTIVATED: *N. patagonica*, pink, summer, 1 in., Patagonia; *repens* (syn. *N. rivularis*), white, summer, 1 in., S. America.

HALF-HARDY SPECIES CULTIVATED: *N. frutescens*, white and yellow, tinged blue, summer, 1 to 3 ft., Chile, and var. *atroviolacea*, dark violet; *gracilis* (syn. *N. filicaulis*), white and yellow, tinged purple, summer, 6 to 9 in., S. America; *hippomaniaca*, white, tinged rose, 3 to 12 in., var. *violacea* (syn. *N. caerulea*), violet-blue, summer, Argentine.

Nigella (Fennel-flower)—*Ranunculaceae*. Hardy annuals. Flowers surrounded by a green mossy involucre. Foliage, green, graceful, feathery. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, sunny, open beds or borders.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in lines, bands or masses in March or April; thin seedlings out 6 in. apart each way, May or June.

SPECIES CULTIVATED: *N. damascena*, 'Love-in-a-Mist', 'Devil-in-a-Bush', blue, summer, 1 to 2 ft., S. Europe, vars. *flore-pleno*, double, blue, *alba*, white; *hispanica*, blue, summer, 1 to 2 ft., Spain; *sativa*, pale blue, summer, 1½ ft., Medit. Region (cultivated for seeds, which are used in seasoning and known as black cummin).

Night-scented Stock, see *Mathiola bicornis*.

Nine Bark, see *Physocarpus*.

Nippon Bells, see *Shortia uniflora*.

Nolana (Chilean Bell-flower)—*Nolanaceae*. Hardy annuals. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, open, sunny beds, borders, or rockeries.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in patches in March or April where plants are required to grow, thinning seedlings to 2 or 3 in. apart in May or June.

SPECIES CULTIVATED: *N. atriplicifolia* (syn. *N. grandiflora*), blue and white, summer, trailing, Peru; *lanceolata*, blue, white, and green, summer, 6 in., Peru.

Nolina, see *Beaucarnea*.

Nomocharis—*Liliaceae*. Hardy bulbous flowering plants, sometimes included in *Lilium*. First introduced early twentieth century.

CULTURE: Soil, well drained, with leaf-mould or peat added. Position, sun or half-shade.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in Jan. or Feb. under glass, transplanted soon after germination or grown in deep seed pan and planted outdoors the next spring or the spring following.

SPECIES CULTIVATED: *N. aperta* (syn. *Lilium apertum*), rose, boldly blotched with crimson, June to July, 1 to 3 ft., W. China; *Farreri*, white with crimson spots, June to July, 2 to 3 ft., N. Burma; *Mairei*, white, usually spotted with red-purple, June to July, 2 to 2½ ft., W. China; *pardanthina*, pink with purple-brown spots, 1½ to 3 ft., W. China; *saluenensis*, white, pale yellow or pale rose, purplish-spotted, 2 to 3 ft., W. China.

Nopalxochia—*Cactaceae*. Greenhouse succulent plants, sometimes included in *Epiphyllum*.

CULTURE: As *Epiphyllum*.

PROPAGATION: As *Epiphyllum*.

SPECIES CULTIVATED: *N. Ackermannii*, crimson, summer, 3 to 4 ft., Mexico; *phyllanthoides*, rose or red, Mexico.

Norfolk Island Palm, see *Rhopalostylis sapida*; **-Pine**, see *Araucaria excelsa*.

Nothofagus (Southern Beech)—*Fagaceae*. Slightly tender evergreen or deciduous trees. First introduced early nineteenth century.

CULTURE: Soil, moist loam. Position, specimens on lawns or in open spaces in milder counties such as Devon and Cornwall. Plant deciduous species Nov. to Feb., evergreen species Sept. or April.

PROPAGATION: By layering in spring.

DECIDUOUS SPECIES CULTIVATED: *N. antarctica*, 40 to 60 ft., S. America; *obliqua*, 50 to 100 ft., Chile.

EVERGREEN SPECIES CULTIVATED: *N. betuloides*, 40 to 60 ft., S. America; *cliffortioides*, 30 to 50 ft., New Zealand; *Cunninghamii*, 40 to 60 ft., Tasmania; *fusca*, 50 to 100 ft., New Zealand; *Menziesii*, 40 to 60 ft., New Zealand; *Moorei*, tinted young foliage, to 150 ft., Australia.

Notholaena—*Polypodiaceae*. Stove and greenhouse ferns. Fronds divided, upper surface green, under covered with white powder or scales. Height from 3 to 18 in. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand, with little charcoal and finely broken sandstone. Position, pots in shady part of house. Pot, Feb. or March. Water moderately Oct. to Feb., freely afterwards. Syringing not required. Temp. stove species, Sept. to March 55° to 65°, March to Sept. 65° to 75°. Greenhouse, Sept. to March 45° to 50°, March to Sept. 55° to 65°. *N. bonariensis* is impatient of water on fronds.

PROPAGATION: By spores sown on surface of fine sandy peat in pans under bell-glass in temp. 75° to 85° any time; division at potting time.

STOVE SPECIES CULTIVATED: *N. bonariensis* (syn. *N. tomentosa*), species of great charm, fronds 1 ft., almost yellow, Mexico; *scariosa* (syn. *N. squamosa*), fronds 6 in., Mexico; *sinuata*, Trop. America; *trichomanoides*, Jamaica and Cuba.

GREENHOUSE SPECIES CULTIVATED: *N. Hookeri*, N. America; *Marantae*, S. Europe, N. Africa, etc.; *Newberryi*, California; *vellea* (syn. *N. languinosa*), S. Europe and Australia.

Notholirion—*Liliaceae*. Hardy bulbous plants, sometimes included in *Lilium*.

CULTURE: Soil, well drained, enriched with leaf-mould. Position, sheltered, cool, in half-shade, except *N. Thomsonianum*.

PROPAGATION: By seed; bulblets formed round base of flower stems, these should be separated and planted apart after flowering.

SPECIES CULTIVATED: *N. campanulatum*, crimson, June, 2½ to 4 ft., N. Burma, Tibet, W. China; *bulbitinum* (syn. *N. hyacinthinum*), lavender, June, 2½ to 3½ ft.,

N. India (Himalaya), Tibet, W. China; *macrophyllum*, pale mauve or lavender, May, 7 to 12 in., N. India; *Thomsonianum* (syns. *Lilium Thomsonianum*, *L. roseum*), pale mauve, May, 2 to 3 ft., N. India, Afghanistan.

Nothopanax—*Araliaceae*. Tender, fast-growing evergreen shrubs with large palmate leaves.

CULTURE: Soil, light well drained. Position, sheltered borders in mildest districts only.

PROPAGATION: By seeds sown in sandy soil in a frame in spring.

SPECIES CULTIVATED: *N. arboreum*, 15 ft., New Zealand; *laetum*, 20 ft., New Zealand.

Notocactus—*Cactaceae*. Greenhouse succulent plants, sometimes included in *Echinocactus*.

CULTURE: As *Echinocactus*.

PROPAGATION: As *Echinocactus*.

SPECIES CULTIVATED: *N. apricus*, yellow, Uruguay; *concinus*, yellow, summer, 4 in., Mexico; *Scopa*, yellow, spring, 12 to 18 in., Brazil, var. *ruberrimus*, crimson-red central spines.

Notospartium—*Leguminosae*. Slightly tender evergreen flowering shrub. First introduced late nineteenth century.

CULTURE: Soil, light well-drained loam. Position, sunny sheltered border. Plant, April or May. Prune in April, thinning out weak wood only.

PROPAGATION: By seeds sown in sandy soil in a cold frame in spring; cuttings in a cold frame in autumn.

SPECIES CULTIVATED: *N. Carmichaeliae*, 'New Zealand Broom', pink, Aug., 4 to 10 ft., New Zealand.

Notothlaspi—*Cruciferae*. Monocarpic alpine plants.

CULTURE: Difficult to grow. Demands perfectly drained scree soil, very stony, and warm, sunny position. Bitterly resents root disturbance and should be sown one or two seeds in a small, deep pot and left undisturbed. Best in alpine house or cold frame.

PROPAGATION: By seeds.

SPECIES CULTIVATED: *N. rosulatum*, 'New Zealand Penwiper Plant', white, fragrant, summer, 9 in., New Zealand.

Nuphar (Yellow Water Lily)—*Nymphaeaceae*. Hardy aquatic perennials.

CULTURE: Soil, six parts strong rich loam, one part well-decayed manure. Position, sunny, shallow streams, ponds or lakes. Depth of water, 6 to 12 in.; plants will live in 4 to 6 ft. of water, but rarely bloom in such depths. Plant, March or Oct. Methods of planting: (1) Strap the root between two turves turned grass-side inwards and lower gently into the water. (2) Plant firmly in a wicker basket in loam, rather on the wet side, and drop into position.

PROPAGATION: By division of the plants in March.

SPECIES CULTIVATED: *N. advenum*, 'Common Spatterdock', yellow, May till Sept., N. America, var. *variegatum*, variegated leaves; *japonicum*, yellow, arrow-shaped leaves above and crimped ones below water, still water, Japan, var. *rubroinctum*, orange-scarlet, reddish stamens; *lutea*, 'Brandy Bottle', yellow, June to Sept., Europe (Br.); *minimum* (syn. *N. pumilum*), yellow, for rock garden pools, July, Europe.

Nutmeg, see *Myristica*; **Californian**-, see *Torreya californica*.

Nuttallia, see *Osmaronia*.

Nymphaea (Water-lily)—*Nymphaeaceae*. Stove and hardy aquatic tuberous-rooted perennials.

CULTURE OF STOVE SPECIES: Six parts rich turfy loam and one part well-decayed manure. Position, large pots or tubs immersed 8 to 12 in. below surface of water in tanks fully exposed to light. Plant, Feb. to April. Temp. of atmo-

sphere 65° to 75° March to Sept., 50° to 60° Sept. to March. Temp. of water 65° to 75° March to Sept., 55° to 65° Sept. to March. Repot annually in Feb. or March. Reduce water as soon as foliage dies off and leave tubers in mud all winter. Alternatively, lift tubers end of Oct., dry off and store in moist sand until spring; beware of rats during this period.

CULTURE OF HARDY SPECIES: Compost, six parts strong, rich loam, one part well-decayed manure or bonemeal at rate of one 5 in. potful per bushel of loam. Depth of water 18 in. to 2 ft. for strong growing kinds, 12 to 18 in. for medium kinds and 9 to 12 in. for the pygmies. Position, open sunny ponds or lakes. Plant, March to June. Methods of planting: (1) Place plant in small wicker basket containing above compost and lower to the bottom of pond or lake. (2) Pack layer of compost 4 in. deep over floor of emptied pool with 1 in. plain loam above it and plant direct into this. Run water in very gradually and at intervals—taking six to eight weeks to fill the pool if growth is slow. (3) Enclose root between turves turned grass-side inwards and strap round or cover with matting and lower carefully into position. (Only use this method if there is a natural mud bottom to the pond).

PROPAGATION: Stove species by seeds sown $\frac{1}{8}$ in. deep in pots of soil immersed in water heated to a temp. of 65° to 75°, March or April. Hardy species by division of tubers or rhizomes, March or April.

HARDY SPECIES CULTIVATED: *N. alba*, 'Common Water-lily', white, summer, Europe (Br.), and vars. *candidissima*, white, and *rosea*, rose; *Barkleyi rosea*, deep rose, hybrid; *candida*, white, Bohemia; *fennica*, white, Finland; *Gladstoniana*, white, hybrid; *Laydekeri*, rose, purplish, suitable for pot culture, hybrid, many named forms, series of hybrids of different parentage raised in France; *Moorei*, yellow, hybrid; *odorata*, white, summer, N. America, and vars. *rosea*, pink, *sulphurea*, yellow; *tetragona* (syn. *N. pygmaea*), white, June; *tuberosa*, white, July, N. America, and var. *Richardsonii*, double.

STOVE SPECIES CULTIVATED: *N. ampla*, white, July, W. India; *Bissettii*, rose, night-flowering, hybrid; *Burtii*, yellow, Tanganyika; *caerulea*, 'Blue Lotus of the Nile', blue, N. and Cent. Africa; *capensis*, 'Cape Blue Waterlily', sky-blue, summer, S. and E. Africa, Madagascar, and vars. *zanzibariensis*, dark blue, *azurea*, blue, and *rosea*, deep rose; *Daubeniana*, viviparous hybrid, will grow in small bowl, blue; *Deaniana*, pink, hybrid; *flavovirens* (syn. *N. gracilis*), white, summer, Mexico; *gigantea*, sky-blue, summer, Australia; *Lotus*, 'White Lotus of the Nile', white, night-blooming, scented, Egypt and Africa; *micrantha*, viviparous, bluish-white, small, W. Africa; *polychroma*, bright blue, summer, Tanganyika; *rubra*, foliage bronze, flowers bright red, nocturnal, India, and var. *devoniensis*; *scutifolia*, blue, summer, Africa; *stellata*, light blue, summer, S.E. Asia, Philippines; *Stuhlmannii*, yellow, Aug., Sept., scented, Africa.

Nymphoides (Floating Heart; Bean Lily)—*Gentianaceae* (or *Menyanthaceae*). Hardy and greenhouse floating perennial aquatics. Formerly known as *Limnanthemum*.

CULTURE OF GREENHOUSE SPECIES: Soil, loam and leaf-mould. Position, tub or tank of water in greenhouse. Temp., Oct. to March 45° to 55°, March to Oct. 55° to 65°. Plant in spring.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, ponds or shallow lakes. Plant in March.

PROPAGATION: Tender species by seeds sown in pots of light soil immersed in water in temp. 65° in spring, or division of the plants in March; hardy species by seeds sown in mud in spring, or division of roots in March.

SPECIES CULTIVATED: *N. indica*, 'Water Snowflake', fringed white flowers just above water, floating, round leaves 1 to 2 in. dia., tender, very beautiful, Florida; *peltata* (syns. *Limnanthemum nymphaeoides*, *Villaisia nymphaeoides*), 'Water Fringe', hardy, 6 to 18 in. water, flowers golden, summer, leaves mottled, floating, Europe, N. America; *trachysperma*, white, floating, tubers hanging in water, tender, Mexico.

Nyssa (Tupelo)—*Nyssaceae*. Hardy deciduous trees. Grown for the beauty of their rich scarlet-tinted foliage in August. Flowers and fruits insignificant.

CULTURE: Soil, ordinary. Position, margins of streams, lakes, etc. Plant in autumn.

PROPAGATION: By layering in autumn.

SPECIES CULTIVATED: *N. aquatica*, white, May, 40 to 50 ft., U. States; *sinensis*, white, May, 30 ft., Cent. China; *sylvatica*, white, June, 30 to 100 ft., N. America.

Oak, see *Quercus*.

Oat, see *Avena*.

Ocimum—*Labiatae*. Half-hardy annual aromatic herbs. Leaves, egg-shaped, aromatic; used for flavouring stews, soups and salads. First introduced early sixteenth century.

CULTURE: Soil, ordinary light rich. Position, sunny well-drained border. Plant, 6 in. apart in rows 9 to 12 in. asunder in May. Shade from sun first few days after planting. Water freely in dry weather. Gather leaves and tops when coming into flower, dry and reduce to powder for winter use.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in shallow box in temp. 55° to 60° in March, transplanting seedlings when three leaves are formed 1 in. apart in similar soil and gradually hardening off in cold frame.

SPECIES CULTIVATED: *O. Basilicum*, 'Sweet Basil', white, summer, 1 ft., Trop. Asia; *minimum*, 'Bush Basil', white, summer, 6 in., Trop. Asia.

Octomeria—*Orchidaceae*. A rather large epiphytic genus allied to *Pleurothallis*, dwarf, tufted habit, stems slender, monophyllous. Flowers, small, terminal to stems.

CULTURE: Compost, as for *Odontoglossum crispum*. Temps. similar. Species with hard-textured leaves need fewer waterings in winter, and a few require a higher temp.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection—*O. Baueri*, yellow, clustered, whitish-yellow, autumn, winter, W. Indies; *crassifolia* (syn. *O. graminifolia*), whitish-yellow, lip with purplish blotch, autumn, Brazil; *diaphana*, white, almost translucent, spring, summer, Brazil; *grandiflora*, few, pale to deep yellow, summer, autumn, Brazil; *Saundersiana*, pale yellow, lip marked purple, in pairs, winter, Brazil.

Odontadenia—*Apocynaceae*. Stove flowering climber. First introduced mid-nineteenth century.

CULTURE: Compost, rough turfy loam, peat, sharp sand and a little broken charcoal. Position, well-drained pots, with shoots trained to roof of stove or to wire trellis. Pot, Feb. or March. Prune, Oct., cutting away shoots that have flowered only. Water very little Oct. to Feb., moderately Feb. to April, freely afterwards. Temp., Oct. to Feb. 55° to 60°, Feb. to Oct. 65° to 75°.

PROPAGATION: By cuttings of young side shoots, 3 in. long, inserted in pots of sandy peat under bell-glass in temp. 80° in Feb., March or April.

SPECIES CULTIVATED: *O. speciosa* (syn. *O. grandiflora*), yellow and orange, fragrant, summer, climbing, Trinidad.

× **Odontioda**—*Orchidaceae*. Bigeneric hybrid between *Cochlioda* and *Odontoglossum*. A great number have been raised. The *Cochliodas*, particularly *C. densiflora* (syn. *C. Noezliana*), have imparted brilliant coloration to the flowers, and secondary and subsequent crosses, with the primary hybrids and *Odontoglossum* hybrids, have given size and varied floral colour. Culture, as for the *Odontoglossums* of the *O. crispum* type.

Odontoglossum—*Orchidaceae*. A large epiphytic genus, so popular that often a house is devoted to them. Of late years, many hybrids, now outnumbering the species, have been produced. Crosses with *Cochliodas*, in particular *C.*

densiflora (*Noezliana*), have imparted brilliant colours to many hybrids, and secondary and subsequent crosses have added large and varied coloration. The genus is variable—many have pseudo-bulbs of fairly soft texture, others hard. Spikes from the base of the leading pseudo-bulbs may be few- or many-flowered, usually simple, sometimes branched. All have beautiful flowers. The leaves are persistent, from thin textures to the coriaceous. A number of natural hybrids occur.

CULTURE: Compost, two parts osmunda fibre, two parts sphagnum moss, rather more fibre for large plants, a few half-decayed oak or beech leaves rubbed to pieces, and sand should be added. Polypodium or other fibres may be added but these should be cut into short lengths. For *O. crispum* and similar-textured plants, and most of the hybrids, a sweet moist atmosphere, as far as possible equable, should be maintained. 60° is a guide, necessarily lower in winter and higher in summer. Summer temps. can often be kept reasonably low by manipulation of blinds and ventilation—never allow humidity to escape by opening vents too widely. Admit air at night whenever weather permits. Syringing and damping can be freely practised in warm weather. Pipe heat can usually be dispensed with from May to Sept., earlier or later. These conditions can only be approximated in winter. Pipe heat is resented but is then necessary. A night temp. of 50° to 55° should be aimed at and allows moderate humidity in the atmosphere. Below 50° plants and atmosphere must be dryer. Whenever possible admit a little air to freshen atmosphere, and increase the day temp. Avoid draughts at all times. Watering is required throughout the year with consideration in cold weather. Differentiation must be made with the harder-bulbed kinds. They may be grown in the same house but should be hung near the glass and the extremes, e.g. *O. grande*, *O. citrosum*, placed on a shelf, as, if they are matured by late autumn, water may be needed but once or twice, if at all, from the end of Oct. to Feb. For *O. Rossii*, *Cervantesii* and similar, a decided rest but not as severe.

Repotting may be effected with the majority of species in spring as growth is seen. Hybrids may be at slight variance with this season, but never pot in the cold months. Both flowers and plants are susceptible to attacks from thrips. Occasional sprayings with weak insecticides deter, but when their presence is evident, dipping should be performed—immerse the plants one by one up to, but not touching, the compost, swirl lightly and then lay the plant on the stage in such a position that the liquid drains from it before returning the plant to its proper place. Choose a rather dull day for the operation. Fumigations also deter, the best time to fumigate is in the evening—beforehand withhold the use of the syringe that the foliage may be fairly dry.

PROPAGATION: By division of plants when potting. Each division should have four bulbs and a growth evident or incipient. Sound back bulbs may be removed singly or in twos, laid on a rather shady part of a shingle-covered stage, or placed in pans or shallow boxes, filled with small potsherds kept damp till growth is seen, then pot using a very small pot.

SPECIES CULTIVATED: A selection—*O. Adrianiae*, a natural hybrid, yellow or white broken with red-brown, spring to summer, Colombia, and many named vars.; *apterum* (syn. *O. nebulosum*), few, white with red-brown spots, brightest on lip, spring to summer, Mexico, var. *candidulum*, without spots; *aspidorhinum*, yellow, blotched red-brown, lip white blotched purple, small, pretty, summer to autumn, Colombia; *bictoniense*, yellowish-green blotched chestnut-brown, lip rose, 2 to 3 ft., autumn, Guatemala, Mexico, var. *sulphureum*, yellow, white; *blandum*, white marked red-purple, pretty, spring, variable, Colombia; *cariniferum* (syn. *O. fuscatum*), brown-yellow, scape branched, Costa Rica, Panama; *Cervantesii*, white or rosy, basal halves with concentric chocolate-red bars, spring, Mexico, Guatemala, var. *decorum*, larger, bars purplish-red; *cirrhum*, white spotted purplish-crimson, segments tapered, scapes often branched, spring to summer, Ecuador, var. *Hrubyana*, white faintly spotted; *citrosum*, white or rose flushed, lip usually rose, scapes long, pendulous, spring to summer, very variable, Mexico, vars. *album*, white, *punctatum*, rose flushed dotted purple; *constrictum*,

yellow blotched red-brown, lip white rose blotched, segments tapered, scapes branched, winter to spring, Venezuela, var. *Sanderianum*, larger and brighter; *Coradinei*, yellow, chestnut blotched, segments narrow, variable, spring, hybrid, var. *mirabile*, larger, finer; *cordatum*, pseudo-bulbs monophyllous, chestnut-brown, broken yellow, lip white brown spotted, scapes sometimes branched, spring, various, Mexico; *coronarium*, chestnut-red bordered yellow, lip bright yellow, requires raft, Colombia, vars. *brevifolium*, leaves and scapes shorter, various, *chiriquense*, larger, scapes taller; *crispum*, white or rose tinged or blotched red, long season, Colombia; *excellens*, yellow blotched chestnut-brown, beautiful, variable, scapes often branched, spring, hybrid, many vars. have been named; *gloriosum*, yellow blotched chestnut-brown, fragrant, segments narrow acuminate, scape often branched, spring to summer, Colombia; *grande*, large yellow chestnut-brown, lip whitish or yellowish with reddish blotches and spots, autumn, Guatemala, var. *aureum*, light and dark yellow; *Hallii*, large brown-red and yellow, lip fringed, segments acute, scapes 2 to 4 ft., spring, Ecuador, Peru, Colombia; *Harryanum*, large, chestnut-brown, yellow, white, spring to summer, Colombia; *harvengtense*, variable, beautiful, yellow spotted cinnamon, hybrid; *hastilabium*, greenish-yellow, purplish-brown, lip white and purplish, segments tapered, spring to summer, Colombia; *Horsmannii*, variable hybrid, white or yellowish, blotched brown, lip base spotted purplish-red, spring, Colombia; *Kegeljanii* (syn. *O. polyxanthum*), yellow blotched cinnamon, lip dark brown, spring, Ecuador; *Krameri*, dwarf, white, light violet, lip purplish-violet, winter to summer, Costa Rica, var. *album*, white; *Lindleyanum*, yellow-brown, segments narrow, spring, Colombia; *luteo-purpureum*, large, yellow, chestnut-brown, lip yellowish, often fringed, spring, very variable, Colombia; *maculatum*, segments acute, spring, Mexico; *maxillare* (syn. *O. madrense*), white, purple-brown blotch at base, lip orange, white, spring to summer, Mexico; *mulus*, yellow, blotched brown, very variable, spring, Colombia; *naevium*, resembles a small *O. cirrhosum*, spring to summer, Colombia; *nobile* (syn. *O. Pescatorei*), white or rose flushed, often purple spotted, scape often branched, spring, Colombia, many named vars.; *odoratum*, golden-yellow, fragrant, spring, Venezuela; *Oerstedii*, dwarf, white, winter to spring, Venezuela; *pulchellum*, small, white, lip uppermost, spring, fragrant, Guatemala, Costa Rica, var. *majus*, larger, strongly scented; *ramosissimum*, white, dotted mauve, scapes tall, branched, spring, Colombia, var. *liliflorum*, rose-purple, white; *Rossii*, dwarf, pretty, white or rose flushed, lip rose flushed, very variable, spring, Mexico; *Schlieperianum*, yellow, barred brown, lip wedge-shaped, late summer to autumn, Costa Rica; *tripudians*, yellow, chestnut-brown, lip white, blotched rose or purple, crest bristled, autumn, spring, Colombia, Peru; *triumphans*, golden-yellow, chestnut-brown, lip white, handsome, variable, spring, Colombia; *Uroskinnei*, greenish, chestnut-brown, lip rose marbled white, scape 2 to 3 ft., spring to summer, Guatemala, vars. *album*, lip white, *splendens*, lip purplish-rose; *Wilckeanum*, large, yellow blotched red-brown, very variable, many vars., all beautiful, spring, Colombia; *Williamsianum*, greenish-yellow barred cinnamon-brown, lip creamy-white, summer, Costa Rica. Many other species and natural hybrids.

Odontonema—*Acanthaceae*. Greenhouse evergreen flowering plants. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts fibrous loam, peat, leaf-mould and sand. Position, well-drained pots in greenhouse Sept. to June, sunny frame or pit June to Sept. Pot, March or April. Water moderately at all times. Temp., Sept. to March 55° to 65°, March to June 65° to 70°. Shorten growths after flowering. Plants may be grown on for second year to form large specimens. Feed with liquid manure or an approved plant food when plants are established in final pots.

PROPAGATION: By cuttings of young shoots inserted in small pots of sandy soil under bell-glass or in propagating frame in temp. 75° March to June.

SPECIES CULTIVATED: *O. Schomburgkianum* (syn. *Thyrsacanthus rutilans*), scarlet-crimson, winter, 3 to 5 ft., Colombia.

× **Odontonia**—*Orchidaceae*. Bigeneric hybrid between *Odontoglossum* and *Miltonia*. Culture, as for *Odontoglossums*, minimum temp. 55°.

Odontosoria—*Polypodiaceae*. Tropical ferns, formerly included in *Davallia*.

CULTURE: As *Davallia*.

PROPAGATION: As *Davallia*.

SPECIES CULTIVATED: *O. aculeata*, climbing, 6 ft., W. Indies; *chinensis* (syn. *Davallia tenuifolia*), drooping habit, Malaya.

Oenothera—*Onagraceae*. Hardy annuals, biennials and herbaceous and shrubby perennials. First introduced early seventeenth century.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny where plants are to flower, or in boxes of light soil in temp. 55° to 65° in April, transplanting seedlings outdoors in May. Thin seedlings sown outdoors to 6 in. apart in June.

POT CULTURE: Compost, two parts good soil, one part leaf-mould, well-decayed manure and sand. Position, well-drained 6 in. pots in cold frame, greenhouse or window. Thin seedlings when 1 in. high to six or eight in each pot. Water moderately at first, freely when in full growth. Apply liquid manure twice a week when plants show flower.

CULTURE OF BIENNIAL SPECIES: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{16}$ in. deep in shady position outdoors in April, transplanting seedlings when 1 in. high, 3 in. apart each way, in sunny border, again transplanting into flowering position following Sept. or March.

CULTURE OF PERENNIAL SPECIES: Soil, light, sandy loam. Position, sunny well-drained borders, beds or rockeries. Plant, Oct., March or April. Water freely in dry weather. Mulch annually with decayed cow manure. Lift and replant every three or four years. Prune away straggling shoots of shrubby species after flowering.

PROPAGATION: Perennial species by seeds sown in light soil in shallow box or well-drained pans in cold frame or under hand-light in March or April, transplanting outdoors end of May or June; cuttings of young shoots inserted in sandy soil under hand-light in shade in spring or summer; suckers removed with roots attached, spring or autumn; division of roots, March or April.

ANNUAL SPECIES CULTIVATED: *O. bistorta*, yellow and red, summer, 1 ft., California; *Drummondii*, yellow, June to Oct., 1 to 2 ft., Texas; *odorata*, yellow, summer, nocturnal, 2 to 3 ft., Chile, and var. *grandiflora*; *tetraptera*, white, summer, 1 ft., Mexico, and var. *rosea*, pink, sometimes erroneously named *O. mexicana rosea*.

BIENNIAL SPECIES CULTIVATED: *O. biennis*, 'Evening Primrose', yellow, fragrant, June to Oct., 4 to 5 ft., N. America, and vars. *grandiflora*, *Lamarckiana*, similar to *O. biennis* but flowers larger; *Clutei*, soft yellow, summer, 3 to 4 ft., Arizona.

PERENNIAL SPECIES CULTIVATED: *O. acaulis* (syn. *O. taraxacifolia*), white or blush, summer, prostrate, Chile, sometimes a biennial; *caespitosa*, white, fragrant, July, 4 to 9 in., California; *fruticosa*, 'Sun-drops', golden yellow, summer, 1 to 2 ft., U.S.A. and vars. *major* and *Youngii*; *glaucæ*, yellow, summer, 2 to 3 ft., Southern U. States, and var. *Fraseri*; *linearis*, yellow, summer, 12 to 18 in., U.S.A. *missouriensis* (syn. *O. macrocarpa*), yellow, summer, trailing, N. America; *Nuttallii*, white or pink, summer, 6 to 9 in., California; *ovata*, golden yellow, May, 6 in., U.S.A.; *perennis*, yellow, summer, 9 to 18 in., N. America; *rosea*, rose, summer, 1 to 2 ft., Texas and New Mexico; *speciosa*, white or pink, summer, 1 to 2 ft., U.S.A.

Oftia—*Myoporaceae*. Greenhouse evergreen shrub. First introduced early eighteenth century.

CULTURE: Compost, sandy loam, leaf-mould and peat. Position, large pots or planted out in prepared border in conservatory or cool greenhouse. Water moderately in winter, freely at other times. Temp., March to Oct. 55° to 60°, Oct. to March 50° to 55°.

PROPAGATION: By cuttings of the young side growths inserted in sandy soil in heated propagating case during spring.

SPECIES CULTIVATED: *O. africana*, white, Feb. to Aug., 3 to 6 ft., S. Africa.

Okra, see *Hibiscus esculentus*.

Old Man, see *Artemisia Abrotanum*.

Old Man's Beard, see *Clematis Vitalba*.

Olea—*Oleaceae*. Slightly tender evergreen flowering shrub. Fruiting in most favoured localities only. First introduced mid-sixteenth century.

CULTURE: Soil, sandy loam. Position, sheltered, sunny borders, or against south or west walls S. of England only. Plant, Sept., Oct. or April. Prune when necessary, April. Protect in very severe weather with litter or mats.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Position, cool greenhouse, Sept. to May; outdoors, June to Sept. Temp., Sept. to May 40° to 50°. Water moderately in winter, freely in summer. Syringe daily April to Sept.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy peat in greenhouse in spring or autumn; cuttings inserted in sandy soil under bell-glass in shade in greenhouse in summer.

SPECIES CULTIVATED: *O. europaea*, 'Olive', white, fragrant, summer, 20 to 40 ft., Asia Minor and Syria.

Oleander, see *Nerium Oleander*.

Olearia (New Zealand Daisy Bush)—*Compositae*. Hardy and slightly tender evergreen flowering shrubs from Australia and New Zealand. First introduced late eighteenth century.

CULTURE: Soil, sandy or chalky loam. Position, sunny borders or walls. Not suitable for outdoor culture in N. England, etc. Plant, Sept. to Nov. or April. Protect those grown against walls during severe weather by covering with straw or mats. Pruning not required except to remove dead or unhealthy shoots in April. Useful maritime shrubs.

PROPAGATION: By cuttings of firm young shoots, 2 to 3 in. long, inserted in well-drained pots of sandy soil under bell-glass in cold, shady frame in summer.

SPECIES CULTIVATED: *O. albida*, fairly hardy, white, summer, 15 ft.; *Haastii*, 'Victoria Snow Bush', the hardiest species, white, July, 5 to 8 ft., compact; *ilicifolia*, 'Mountain Holly', 'New Zealand Holly', hardy, white, summer, 6 to 10 ft.; *lineata*, white, fragrant, summer, slender to 10 ft.; *macrodonia*, white, summer, good maritime screen, 15 ft.; *myrsinoides*, white, May to June, 5 ft., for low walls; *nummularifolia*, curious round yellowish leaves, 5 ft.; *odorata*, fragrant, summer, slender, to 10 ft.; *paniculata* (syn. *O. Forsteri*), white, summer, wavy apple-green foliage, 20 ft.; *semi-dentata*, mauve, July, 5 to 8 ft.; *stellulata* (syn. *O. Gunniana*), white, May to June, 6 ft., Tasmania, var. *splendens*, mauve to rose pink; *virgata*, fragrant, July, slender, 8 ft.

Oleaster, see *Elaeagnus angustifolia*.

Olive, see *Olea europaea*.

Omphalodes (Navel-wort)—*Boraginaceae*. Hardy annual and perennial herbs. First introduced early seventeenth century.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, partially shaded borders. Sow seeds in masses where required to grow—in April to flower in June, June to flower in Sept., and Sept. to flower in spring.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary rich, moist. Position, partially shaded, well-drained borders or rockeries, or in rhododendron beds. Plant, Oct., Nov., March or April. Water copiously in dry weather. Mulch with decayed cow manure annually in spring.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in light, rich soil in semi-shaded position in April, transplanting seedlings when 1 in. high; division of roots, March or April.

ANNUAL SPECIES CULTIVATED: *O. linifolia*, 'Venus Navel-wort', white, June, 6 to 9 in., S. Europe.

PERENNIAL SPECIES CULTIVATED: *O. cappadocica* (syn. *O. cornifolia*), blue, early summer and autumn, 6 to 9 in., S. Europe; *Lojkae*, blue, spring, 6 in., Caucasus; *Luciliae*, 'Rock Forget-me-not', blue, summer, 6 in., Asia Minor; *nitida*, blue, May, 6 to 9 in., Portugal; *verna*, 'Creeping Forget-me-not', 'Blue-eyed Mary', blue, spring, 6 in., Europe, and var. *alba*, white.

Omphalogramma—*Primulaceae*. Small Asiatic genus allied to *Primula*.

CULTURE: Moist, deep, rich soil and a north or half-shaded position.

PROPAGATION: By seeds sown as soon as ripe in compost as above.

SPECIES CULTIVATED: *O. Coxii*, purplish-rose, summer, 6 in., Burma and China; *vinciflorum*, violet-purple, summer, 9 to 12 in., China.

× **Oncidioida**—bigeneric hybrid between *Oncidium* and *Cochlioda*.

Oncidium—*Orchidaceae*. A large polymorphic genus, over 500 species, epiphytal, with minor exceptions. Many handsome species are included, pseudo-bulbs are present in the greater number and the scapes, simple, paniced or with one or few flowers, are produced from the base of the new pseudo-bulb or in the practically pseudo-bulbless, monophyllous species, from their rhizome bases. The distinguishing feature of the flowers is a swelling at or near the base of the column and a toothed or warted crest on the lip base. Great variation is present.

CULTURE: With such a varied group the individual kinds must be studied. Compost for all may be as for *Odontoglossum*, the dwarf-growing kinds placed in pans, the larger in pots. Drainage must be ample from one-eighth to one-quarter of the pot in depth. Species with hard coriaceous leaves and/or pseudo-bulbs must have a decided rest, *O. splendidum* at least two months; the cool house species may require a few soakings during the winter. Kinds suited to the *Odontoglossum* house treated as for *Odontoglossums* but with fewer winter waterings. All when in vigorous growth need frequent waterings and particularly with the cool house species, as soon as matured, the plants should be exposed to full light in autumn, the smaller should be hung near the glass throughout the year. Though a rest is advocated for the pseudo-bulbed and coriaceous-leaved kinds, neither leaves nor bulbs must be allowed to shrivel for want of water.

PROPAGATION: By division of plants in spring. Pseudo-bulbs can be separated as suggested for *Odontoglossums*, *Cymbidiums*, etc., but do not respond as readily. A few species produce young plants on the flower spikes.

SPECIES CULTIVATED: A selection, suited to the *Odontoglossum* house. The following have long flexuous scapes, extending to 12 ft. or more, in some. In several the petal tips, owing to their serrated margins, interlock apically. The lips are small, fleshy and usually contrast in colour with the sepals and petals. *O. annulare*, rich chestnut-brown and yellow, various, Colombia; *Baldeviamae*, polished ochre-brown, yellow blotched, summer, Colombia; *Claesii*, sepals brown, petals flushed purple, summer, Colombia; *corynephorum*, rose, violet-rose, whitish, lip crimson-purple (*O. volubila* may be the correct name), various, Peru; *falcipetalum*, dark brown, yellow, autumn, Venezuela; *grandiflorum*, rich brown; *lamelligerum*, light brown, light yellow, variable, summer, Ecuador; *Leopoldianum*, white, rose-purple, various, Peru; *loxense*, chocolate-brown, barred yellow, lip broad, orange-yellow, spring, summer, Ecuador; *macranthum*, a fine variable species, sepals yellow shaded olive-brown, petals yellow, spring, summer, Ecuador, Peru; *metallicum*, metallic chestnut-brown, borders marked yellow, spring, Colombia; *Rolfeanum*, brown, yellow, summer, Colombia; *Sanderianum*, chocolate-brown, yellow and golden, summer, Peru; *superbiens*, sepals red-brown, petals whitish, with brown bars, spring, various, Colombia, Venezuela; *undulatum*, bronze-brown, petals white blotched purplish, summer, Colombia.

Other species suited to the *Odontoglossum* house but smaller. Should be hung near the glass and consideration given to the frequency or infrequency of winter waterings. *O. acrobotryum*, brown and yellow, lip wedge-shaped, small, many, spring, summer, Brazil; *cheiophorum*, bright yellow, fragrant, small,

densely set, autumn, winter, Colombia; *macrochilum*, crimson, purple, W. Indies; *nubigenum*, brownish, lip white, yellowish, violet; *olivaceum* (syn. *O. cucullatum*), scapes 1 to 2 ft. high, olive green or chestnut brown, lip light rose-purple and purple crimson, very variable, pretty, spring, Colombia into Ecuador; *ornithorynchum*, rose-lilac, small, fragrant, many, branched drooped scapes, early winter, Mexico, Guatemala; *phalaenopsis*, creamy white, deep purple, violet-crimson; *Waluewa*, whitish, banded pale purple, lip yellowish, spotted rose, spring, Brazil.

COOL HOUSE SPECIES: Winter night temp. 50°, summer temp. 60° to 80°, light shading. Infrequent, if any waterings in winter. *O. aureum*, yellow, brown, spring, Colombia; *Batemannianum*, bright yellow, crest purplish, scape up to 4 ft., various, Brazil; *bicolor*, yellow, dotted chestnut, autumn, Brazil; *bifolium*, dwarf, yellow, marked red-brown, early summer, Brazil; *bracteatum*, yellowish, spotted black-purple, lip yellow, 3 to 4 ft., spring, summer, Costa Rica, Colombia; *caloglossum* yellow, dark brown, various, Brazil; *candidum*, white, lip hiding the lower sepals from view, summer, Guatemala; *concolor*, canary yellow, scape drooping, spring, summer, Brazil; *crispum*, large, greenish-brown, chestnut-brown, broken with yellow, autumn, winter, Brazil; *curtum*, 2 to 3 ft., chestnut-brown, broken and edged with yellow, lip yellow with margin of chestnut spots, spring, Brazil; *dastyle*, yellow, red-brown, crest curious, the 'parson-in-the-pulpit' orchid, spring, Brazil; *dichromum*, bronze-red, shaded yellow, lip clear yellow, spring, Peru; *elegantissimum*, yellow spotted chestnut-brown, hybrid; *excavatum*, variable, yellow, barred brown, autumn, Peru, Brazil; *Forbesii*, rich chestnut broken with yellow, autumn, Brazil; *Gardneri*, (*dastyle* × *Forbesii*), chestnut-brown, yellow, various, Brazil; *Harrisonianum*, dwarf, yellow, red-spotted, mid-lobe of lip spreading, autumn, Brazil; *hastatum*, variable, yellowish-green, brown, claret-red, summer, autumn, Mexico; *incurvum*, purplish, white, many, fragrant, autumn, Mexico; *Mantini*, chestnut-brown, yellow, winter, Brazil; *Marshallianum*, variable, handsome, yellow, red-brown, spring, Brazil; *leucochilum*, yellowish, greenish, dark brown, lip white, various, Mexico; *Martianum*, yellow, chestnut-brown, spring, summer, Brazil; *praetextum*, light chestnut-brown, yellow, spring, summer, Brazil; *spiloptrume*, yellow, brown, disk of lip magenta-purple, tubercled, spring, Brazil; *suave*, yellow, red-brown, fragrant, summer, autumn, Mexico; *tigrinum*, yellow, chestnut-brown, lip yellow, fragrant, autumn, winter, Mexico; *varicosum*, yellow, barred red-brown, lip large, yellow, autumn, winter, Brazil; *Wentworthianum*, yellow, blotched red-brown, summer, Guatemala; *Wheatleyanum*, chestnut-brown, crimson, yellow, various, Brazil.

The following selection should have the same conditions as Cattleyas. Rest given according to the nature of the leaf or pseudo-bulbs. *O. altissimum*, tall, yellow, brown, summer, W. Indies; *Baueri*, near *altissimum*, spikes branched from near their base, summer, W. Indies, Brazil; *bicallosum*, greenish, yellow lip bright yellow, winter, Guatemala; *carthaginense*, cream-white, spotted purplish-rose, variable, summer, Trop. America; *Cavendishianum*, yellow, bright yellow, winter, spring, Trop. America; *Cebolleta*, yellow, spotted red-brown, lip yellow, leaves terete, spring, summer, Brazil, Trop. America; *divaricatum*, chestnut, yellow, many, summer, autumn, Brazil; *fimbriatum*, yellow, red, small, many, spring, Brazil; *flexuosum*, red-brown, yellow, lip yellow, rhizome ascendant, support required, various Brazil; *Jonesianum*, white, yellow, chestnut-brown and red spotted, variable, beautiful, leaves terete, autumn, Paraguay; *Lowii*, yellow, spotted red-brown, spring, Mexico; *microhilum*, brown, broken with yellow, white and purple, small, many, summer, autumn, Guatemala; *oblongatum*, yellow, reddish-brown, variable, winter, Guatemala, Mexico; *obryzatum*, yellow, red-brown, winter, Peru; *phymatochilum*, 'The Gnat Orchid', creamy-white, marked red, many, summer, Mexico; *pubes*, red-brown, yellow, small, many, summer, Brazil; *pulvinatum*, red-brown, yellow, many, scape needs support, summer, Brazil; *pyramidale*, bright yellow, red spotted, summer, Colombia; *sarcodes*, chestnut-brown, broken with yellow, spring, summer, Brazil; *sphacelatum*, dark chestnut-brown, yellow, summer, Mexico, Guatemala.

A selection for the stove house, winter temp. not less than 65°. *O. ampliatum*, yellow, blotched red-brown, lip canary yellow, spring, Panama, Costa Rica, etc.; *citrinum*, yellowish, lip citron yellow, autumn, Trinidad; *haematochilum*, rare, yellowish and chestnut brown, lip blood-red, autumn, Trinidad; *Kramerianum*, scapes noded, flowers in succession, upper sepal and petals narrow, erect, reddish-brown, lower sepals larger, orange-red and yellow, lip yellow, margin spotted red-brown, frilled, small pans, various, Colombia, Ecuador; *Lanceanum*, yellow, greenish, red spotted, lip rose-purple, handsome, summer, Trinidad; *Linninghii*, ochre, brown, yellow and red marked flowers, in succession, raft or tree fern stem, summer, Venezuela, Brazil; *luridum*, many yellow, greenish, blotched red, variable, spring, W. Indies; *Papilio*, 'Butterfly Orchid', near *O. Kramerianum*, scape flattened on upper portion, flowers larger, upper sepals and petals red, barred dull yellow, lower sepals chestnut-red, barred yellow, lip yellow bordered red, various, Trinidad, Venezuela; *pulchellum*, white, flushed rose, variable, pseudo-bulbs absent, summer, W. Indies, Brazil; *pusillum* (syn. *O. iridifolium*), yellowish, sometimes purple zoned, lip purplish, pseudo-bulbs absent, summer, autumn, Trop. America; *quadripetalum*, chestnut-brown, barred yellow, lip whitish, red, pseudo-bulbs absent, spring, summer; *Sanderæ*, allied to *O. Papilio*, clear yellow, red-brown, column wings in filaments, various, Peru; *splendidum*, yellowish, blotched rich brown, lip canary yellow, large, midwinter, Guatemala, Brazil; *triquetrum*, habit of *O. pulchellum*, purplish, green, whitish, purple spotted, autumn, Jamaica; *urophyllum*, near *pulchellum*, small, many, yellow, blotched chestnut, lip yellow, summer, autumn, W. Indies.

Onion, see *Allium Cepa*; **Everlasting-**, see *A. Cepa* var. *perutile*; **Potato-**, see *A. Cepa* var. *aggregatum*; **Tree or Top-**, see *A. Cepa* var. *viviparum*; **Welsh-**, see *A. fistulosum*.

Onoclea—*Polypodiaceae*. Hardy deciduous ferns. Fronds, barren ones, broad, once-divided, green; fertile ones, narrow, contracted, once-divided, brown. First introduced late eighteenth century.

OUTDOOR CULTURE: Soil, two parts good loam, one part leaf-mould. Position, semi-shaded, cool, moist border or margins of ponds. Plant, April.

POT CULTURE: Compost, two parts fibrous loam, one part leaf-mould, one part sand. Position, well-drained pots in shady cold frame or greenhouse. Pot, March or April. Water copiously April to Sept., moderately Sept. to Nov., keep nearly dry Nov. to March. Repot annually.

PROPAGATION: By spores sown on surface of well-drained pan of sandy peat and leaf-mould covered with square of glass, and kept moderately moist in shady position in cold frame or greenhouse; division of plants, March or April.

SPECIES CULTIVATED: *O. sensibilis*, 'Sensitive Fern', 2 to 3 ft., N. America and N. Asia.

Ononis (Rest-harrow)—*Leguminosae*. Hardy herbaceous perennials and deciduous shrubs. First introduced mid-sixteenth century.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny borders, banks or rockeries. Plant, Oct., Nov., March or April. Cut down flower stems, Oct. Mulch with manure, March. Lift and replant in fresh soil every four or five years.

CULTURE OF SHRUBBY SPECIES: Soil, ordinary. Position, sunny borders or banks. Plant, Oct. to Feb. Prune into shape, Jan. to Feb.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in ordinary soil in semi-shady position outdoors, March or April; or in shallow boxes or pans in cold frame or greenhouse in March; perennials by division of roots, Oct. to March.

PERENNIAL SPECIES CULTIVATED: *O. cenisia*, pink, summer, 6 in., Europe; *Natrix*, 'Goat Root', yellow and red, summer, 1 to 2 ft., S. Europe; *spinosa* (syn. *O. arvensis*), rose and white, summer, 6 in., Europe (Br.).

SHRUBBY SPECIES CULTIVATED: *O. fruticosa*, purple, summer, 2 ft., Europe; *rotundifolia*, rose-pink, May to Aug., 1½ ft., Europe.

Onopordum—*Compositae*. Hardy biennial and perennial thistle-like herbs.

CULTURE OF BIENNIAL SPECIES: Sow seeds $\frac{1}{8}$ in. deep in ordinary soil in sunny position outdoors, March or April. Transplant seedlings following Sept. to where required to flower.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary rich. Position, well-drained sunny borders. Plant, Oct. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in ordinary soil in sunny position outdoors, March or April, transplanting seedlings to flowering position Sept. or Oct.

BIENNIAL SPECIES CULTIVATED: *O. arabicum*, 8 to 10 ft., S. Europe; *illyricum*, 6 ft., S. Europe.

PERENNIAL SPECIES CULTIVATED: *O. Acanthium*, 'Cotton Thistle', 'Scotch Thistle', 5 ft., Europe (Br.).

Onosma (Golden Drop)—*Boraginaceae*. Hardy perennial herbs. First introduced late seventeenth century.

CULTURE: Soil, two parts sandy loam, one part grit or small stones. Position, sunny rockery where roots can descend close to cool, moist stones and shoots trail over edge. Plant, March or April. Place a few small stones on surface of soil round plant. Water occasionally in dry weather. Mulch annually with decayed cow manure in March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy loam and grit in shallow pans in shady, cold frame of cool greenhouse in March, planting outdoors in May; cuttings of shoots inserted in sandy soil in close, shady frame or under hand-light in July or Aug.

SPECIES CULTIVATED: *O. albo-roseum*, white and rose, summer, 6 in., Asia Minor; *Bourgaei*, white, summer, 6 in., Armenia; *cassium*, yellow, summer, 18 in., N. Syria; *Sieheana*, pink, summer, 9 in., E. Europe; *stellulatum*, yellow and white, May, 6 in., Europe, var. *tauricum*, yellow, May, 1 ft., Europe; *Waddellii*, blue, summer, 9 in., Himalaya.

Onychium—*Polypodiaceae*. Stove and greenhouse evergreen ferns. Fronds green, light and graceful, four times divided.

CULTURE: Compost, two parts peat and loam, leaf-mould and sand in equal parts. Position, well-drained pots, beds or rockeries in shade. Pot or plant, Feb. or March. Water copiously March to Sept., moderately afterwards. Moist atmosphere essential. Temp. stove species, March to Sept. 65° to 75°, Sept. to March 55° to 65°; greenhouse species, March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By spores sown on surface of fine sandy peat in well-drained pans in shade and temp. 70° to 80° any time; division of plants at potting time.

STOVE SPECIES CULTIVATED: *O. siliculosum* (syn. *O. auratum*), 1 ft., Malaya.

GREENHOUSE SPECIES CULTIVATED: *O. japonicum*, 1 ft., Japan, Himalaya.

Ophioglossum—*Ophioglossaceae*. Hardy deciduous fern. Barren fronds, egg-shaped, pale green; fertile ones contracted, spike-like.

OUTDOOR CULTURE: Soil, moist, loamy. Position, in tufts of grass on partially shaded rockery. Plant, April to Aug. Lift plants growing wild with large sod attached and plant fern and sod together. Water freely in dry weather.

POT CULTURE: Compost, sandy loam and leaf-mould in equal parts. Position, shallow pans, well drained, in cold, shady frame. Plant, April to Aug. Water freely March to Sept., keep just moist afterwards.

PROPAGATION: By spores gathered when ripe in July and sown on surface of pans of above soil, covered with a sheet of glass, and placed in a cool, moist frame or greenhouse; division of plants in April.

SPECIES CULTIVATED: *O. vulgatum*, 'Adder's Tongue Fern', 4 to 6 in., in moist meadows, Britain, several forms or vars., some of which have led to other questionable specific names.

Ophiopogon (Snake's-beard)—*Liliaceae*. Hardy evergreen perennial herbs. First introduced late eighteenth century.

OUTDOOR CULTURE: Soil, sandy loam. Position, edgings to or groups in sunny borders. Plant, Oct. or March. Lift, divide and replant every four or five years.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed manure, and one part sand. Position, well-drained pots or in small beds in cold or heated greenhouses, conservatories, ferneries or windows. Adapted for sun or shade. Pot or plant, Feb. or March. Water copiously March to Oct., moderately afterwards. Apply stimulants once or twice weekly April to Sept.

PROPAGATION: By division of plants in Feb. or March.

SPECIES CULTIVATED: *O. Jaburan*, white, July, 1 ft., Japan; *japonicus*, white, hidden among the 6 to 15 in. long, dense, grassy leaves, summer, Japan.

Ophrys—*Orchidaceae*. A terrestrial genus distributed in south and mid-Europe and Mediterranean border. A few in England. Though all are deciduous, the continental species are not altogether suited to English gardens, and an alpine house has advantages in that the early growths are protected. Several natural hybrids are known.

TREATMENT: The greater number prefer a well-drained loam in limestone or chalk foundation, hence nodules of old mortar rubble should be mixed in the compost which should consist chiefly of loam and sand. A fairly sunny position should be given, particularly for the Italian species. While growing, water may be given liberally, but the tubers enjoy a rather dry rest. Both outdoor and indoor treatments are similar. The tubers are impatient of disturbance under glass; they should be repotted every second year, just before growth is expected.

PROPAGATION: Can seldom be effected, but secondary tubers are sometimes developed.

BRITISH SPECIES CULTIVATED: A selection—*O. apifera*, 'Bee Orchid', stem 12 in., greenish, rosy, lip velvet-brown, early summer, variable, var. *alba*, white or yellowish white; *fuciflora* (syn. *O. arachnites*), stem 8 to 15 in., rosy with greenish lines, early summer; *insectifera* (syn. *O. muscifera*), 'Fly Orchid', stems 4 to 20 in. high, greenish, reddish, lip purplish-brown, velvety with a glossy area, spring, summer; *sphogodes* (syn. *O. aranifera*), 'Spider Orchid', stem 6 to 15 in., yellowish green, rose tinged, lip brown or purplish brown, velvety with yellowish spots or lines, spring.

EXOTIC SPECIES CULTIVATED: *O. Bertolonii*, stem 4 to 12 in., rose or whitish red, nerved, lip velvety purple, with a bluish area, S. Europe, Italy; *bombylifera*, 'Humble-Bee Orchid', stem 4 to 8 in., green, purplish flushed, lip velvety-brown, spring, Mentone, etc.; *cornuta*, stem 8 to 15 in., rose-red, petals haired, lip brown, white marked, spring, summer, Caucasus; *fusca*, stem 4 to 12 in., yellowish-green, lip yellowish-brown, velvety with two glossy areas, spring, S. Europe; *lutea*, stem 4 to 12 in., yellowish-green, lip yellow, or brownish-yellow, velvety, two glossy areas, spring, S. Europe; *Philippei*, greenish, lip margined brown, France; *Scolopax*, 'Woodcock Ophrys', stem 4 to 15 in., rosy, lip purplish, velvety, with yellow-bordered glossy areas, spring, S. Europe.

Oplismenus—*Gramineae*. Greenhouse perennial, trailing grass. Flowers insignificant. Stems, small, wiry, trailing. Leaves, green, variegated with white and pink. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, small pots with shoots draping front of staging, or in baskets suspended from roof; sun or shade. Pot, March. Water freely March to Oct., moderately afterwards. Apply stimulants occasionally in summer. Temp., March to Sept. 60° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings of young shoots inserted in light, sandy soil in small pots under bell-glass or hand-light in temp. 65° to 75° at any time.

SPECIES CULTIVATED: *O. compositus* (syn. *O. Burmannii*, *O. hirtellus*), 'Basket Grass', trailing, Tropics.

Oplopanax—*Araliaceae*. Prickly deciduous shrub formerly included in *Fatsia*.

CULTURE: As *Fatsia*.

PROPAGATION: As *Fatsia*.

SPECIES CULTIVATED: *O. horridus* (syn. *Fatsia horrida*), 'Devil's Club', spiny stems and leaves, 6 ft., spreading, deciduous, N.W. America and Japan.

Opuntia (Prickly Pear)—*Cactaceae*. Greenhouse and hardy succulent plants. Stems, fleshy, flat, bristly. Leaves, small, unimportant, fugacious. First introduced late sixteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts sandy loam, one part powdered brick rubbish and old mortar. Position, sunny, airy greenhouse or window. Pot, March or April in pots filled $\frac{1}{2}$ of depth with potsherds and just large enough to accommodate roots. Repot every three or four years only. Water moderately March to Sept., once a fortnight Sept. to Nov., none afterwards. Apply stimulants to healthy plants June to Sept. Ventilate freely in summer. Temp., March to Sept. 60° to 70°, Sept. to March 50° to 55°.

CULTURE OF HARDY SPECIES: Soil, sandy loam freely interspersed with powdered brick or old mortar. Position, sunny well-drained rockeries. Plant, March or April. Cover surface of soil between plants with small pieces of stone. Sprinkle soot freely between plants occasionally to keep away slugs. Apply weak liquid manure occasionally during summer to healthy plants only.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in well-drained pots or pans of sandy soil in temp. 75° in March. Keep soil moderately moist; cuttings of portions of stems exposed for a few days, then inserted in small, well-drained pots of lime and brick dust in temp. 65° to 75°, summer; delicate species by grafting on robust kinds in April.

GREENHOUSE SPECIES CULTIVATED: *O. Bigelovii*, flowers not known, 10 ft., California; *brasiliensis*, yellow, June, 10 to 30 ft., Brazil; *cylindrica*, scarlet, summer, 4 to 6 ft., Peru, and var. *cristata*, crested; *echinocarpa*, green, summer, 18 in., U. States; *Ficus-indica*, 'Indian Fig', yellow, May, 2 ft., Trop. America, *glaucophylla*, yellow, 2 ft., Mexico; *imbricata*, purple, June, 5 to 30 ft., South United States and Mexico; *leucotricha*, yellow, June, Mexico; *maxima* (syn. *O. decumana*), orange, summer, 10 to 15 ft., S. America; *Pottsii* (syn. *O. filipendula*), purple, May and June, 2 ft., Texas; *Stanlyi* (syn. *O. Emoryi*), yellow and purple, Aug. to Sept., 18 in., Mexico; *Tuna*, reddish-orange, July, 10 to 20 ft., S. America; *Whipplei*, red, June, U.S.A.

HARDY SPECIES CULTIVATED: *O. compressa* (syn. *O. Rafinesquei*), yellow and red, June, 1 ft., N. America; *Engelmannii*, yellow, May to June, 6 in., South U.S.A.; *polycantha* (syn. *O. missouriensis*), yellow, May and June, 6 in., N. America; *rhodantha*, carmine, June, Colorado; *vulgaris*, 'Barbary Fig', yellow, 2 ft., U.S.A.

Orach, see *Atriplex hortensis*.

Orange, see *Citrus sinensis*; **-ball Tree**, see *Buddleia globosa*; **-Daisy**, see *Erigeron aurantiacus*; **Mandarin or Tangerine-**, see *Citrus nobilis* var. *deliciosa*; **Osage-**, see *Maclura pomifera*; **Seville-**, see *Citrus Aurantium*.

Orchis—*Orchidaceae*. A rather large, deciduous, terrestrial genus allied to *Ophrys* and *Habenaria*. Several natural hybrids occur. Habit as in *Ophrys*, a stem rising from a tuber which supports and forms another, lip spurred. The genus is widely distributed in England, Africa and N. America.

CULTURE: The English species are more amenable in our gardens than *Ophrys* and several are suitable for rockeries. A well-drained loam with sand suits the majority but it is well to make a compost similar to that in which the species grow. Exotic species may be treated as exotic *Ophrys*, but if possible ascertain the nature of the soil in which particular species grow.

PROPAGATION: As for *Ophrys*.

SPECIES CULTIVATED: *O. ericetorum* (syn. *O. elodes*), flowers densely set, stem 8 to 10 in., summer, Britain, Europe; *Fuchsii* (syn. *O. maculata*), lilac or whitish, rose or purple streaked, spotted darker colour, very variable, summer, Britain, Europe, *latifolia* (syn. *O. incarnata*), flesh colour or rose, lip darker, spring, stem 10 to 20 in., Britain, Europe; *maderensis* (syn. *O. foliosa*), purple, summer, 1 to 2 ft., Madeira:

mascula, purplish-crimson, variable, disk or lip downy, damp loam, spring, stem 8 to 24 in., Britain, Europe, Siberia, Africa; *militaris*, reddish, striped purple, lip purplish-white or rosy, spring, summer, stem 1 to 2 ft., S. England, Europe; *Morio*, purplish, petals green veined, lip broad, spring to summer, Britain, Europe; *pallens*, many pale and deep yellow, spring, stem 12 to 15 in., Europe; *pardalina*, purple-red to white, variable, spring to summer, stem 8 to 24 in., Britain, Europe, Asia; *purpurella*, dark purple, summer, 4 to 6 in., England, Holland; *pyramidalis*, (correctly *Anacamptis pyramidalis*) rose or purplish-red, summer, 1 ft., Britain; *sambucina*, yellow or purple, spring to summer, 6 to 9 in., Europe; *simia*, 'Monkey Orchis', greenish-white, lip often crimson, variable, summer, England, Europe; *spectabilis*, pinkish-purple, spring to summer, 4 to 7 in., N. America; *tridentata*, purplish-rose, lip flesh colour red spotted, spring to summer, S. Europe; *ustulata*, 'Scorched Orchis', brownish-purple, lip whitish, chalky loam, spring, summer, 4 to 8 in., Britain, Europe, W. Siberia.

Oreopanax—*Araliaceae*. Stove evergreen ornamental-foliaged plants or shrubs. First introduced mid-seventeenth century.

CULTURE: Compost, equal parts loam, peat and leaf-mould, with charcoal and sand added. Pot, Feb. to April. Water freely March to Oct., moderately afterwards. Temp., March to Sept. 70° to 80°, Sept. to March 60° to 70°.

PROPAGATION: By grafting in heat during spring on to stocks of *O. reticulatum*. Cuttings inserted in sand in propagating case and by portions of the roots in April.

SPECIES CULTIVATED: *O. capitatum* (syn. *Aralia catalpifolia*), S. America; *guatemalense*, Guatemala; *nymphacifolium*, locality unknown; *platanifolium* (syn. *Aralia platanifolium*), Andes; *reticulatum* (syn. *Aralia reticulata*), S. America; *Sanderianum*, Guatemala; *Xalapense* (syn. *O. Thibautii*), Mexico.

Origanum—*Labiatae*. Perennial herbs cultivated for the aromatic foliage and attractive small purple-pinkish flowers borne in spikes. Sometimes listed as *Amaracus*. See also *Majorana*.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Position, well-drained warm borders or greenhouse. Pot, Feb. or March, plant out late May.

PROPAGATION: Division of roots in March or April.

SPECIES CULTIVATED: *O. Dictamnus*, 'Cretan Dittany', pink, summer, 1 ft., Crete; *hybridus*, pink, late summer, 12 in., hybrid; *pulchellum*, purple, summer, 6 to 9 in., Greece.

Ornithidium—*Orchidaceae*. A genus of about twenty epiphytic species. In some the pseudo-bulbs are carried on ascendant or pendulous rhizomes. The flowers fascicled, small, produced in the axils of the leaves. In others a cushion-like habit is assumed, the flowers being solitary. Erect stems are also present, from the midst of smaller growths, carrying the flowers in axillary fascicles.

CULTURE: Compost, as for *Maxillarias*. Species with pendulous habit should be placed in baskets. In summer the temp. then can reach the sub-tropical, with shading and a moist atmosphere. Water is required throughout the year, not too frequently in winter. Winter temp. 50° to 55° to 60°.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *O. coccineum* (syn. *Cymbidium coccineum*), coral-red to scarlet-red on leafy growths, winter, spring, W. Indies; *densum* (syn. *Maxillaria densa*), greyish-white, tinged purple, reddish, in fascicles on growths, 2 ft. high, Guatemala, Mexico; *sophronitis*, bright scarlet, cushion-like habit, shallow pans, spring, cool house, Venezuela.

Ornithocephalus—*Orchidaceae*. An epiphytic genus, many of the species are of botanical interest only. Pseudo-bulbs small or absent. Flowers small, usually with a large rostellum.

TREATMENT: Compost of finely cut osmunda fibre and equal bulk of chopped sphagnum. Small pans, suspended near glass. Shade carefully. A moist atmosphere and water are required throughout the year.

PROPAGATION: By division of plants, if large enough, in spring.

SPECIES CULTIVATED: *O. grandiflorus*, white and green, usually twenty, attractive, pseudo-bulbs small, early summer, Brazil; *multiflorus*, allied to preceding, smaller, white, summer, Brazil; *Tonduzii*, pseudo-bulbs absent, small, crystalline white, lip green, leaves pretty, summer, Costa Rica.

Ornithochilus—*Orchidaceae*. A small epiphytic genus allied to *Phalaenopsis*. Only one species is met with in orchid collections, resembling *Phalaenopsis* in habit, racemes lateral often branched.

TREATMENT: Compost, etc., as for *Phalaenopsis*.

PROPAGATION: Can seldom, if ever, be effected.

SPECIES CULTIVATED: *O. fuscus* (syns. *Aerides difforme*, *A. hystrix*), yellow, greenish-yellow, streaked or suffused red, lip usually reddish and generally fimbriated, spur yellowish, spring, summer, Himalaya, Burma, Hong Kong.

Ornithogalum—*Liliaceae*. Hardy and greenhouse bulbous plants.

OUTDOOR CULTURE: Soil, rich ordinary, sandy. Position, sunny borders, rockeries or turf. Plant, Aug. to Nov., placing small bulbs 3 in. and large bulbs 4 to 6 in. below surface and 2 to 3 in. apart. Mulch annually in March with decayed manure. Apply weak stimulants occasionally in summer.

INDOOR CULTURE: Compost, two parts sandy loam, one part equal proportions leaf-mould, peat and sand. Position, pots in sunny greenhouse or window. Pot, Sept. to Feb., placing several small or one large bulb in a 5 or 6 in. pot. Good drainage essential. Water moderately when growth begins, freely when in full growth, gradually withholding when foliage turns yellow and keeping dry till new growth begins. Apply stimulants occasionally while in full growth. Repot annually. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By offsets, removed from old bulbs and repotted, Sept. to Feb.

GREENHOUSE SPECIES CULTIVATED: *O. arabicum*, white, fragrant, summer, 2 ft., S. Europe, hardy in sheltered borders with slight winter protection; *biflorum*, white, April, 1 ft., Chile and Peru; *lacteum*, 'Chincherinchee', white, summer, 1½ ft., S. Africa; *longibracteatum*, white, May, 1 to 2 ft., S. Africa, and var. *variegatum*.

HARDY SPECIES CULTIVATED: *O. nutans*, silvery grey and pale green, spring, 1 ft., Europe (Br.), var. *Boucheanum*, a superior form; *narbonense*, white, early summer, 2 ft., Medit. Region, and var. *pyramidale*; *pyrenaicum*, yellowish-green, June, 2 ft., S. Europe; *umbellatum*, 'Star of Bethlehem', white, May, 1 ft., Europe.

Orobis, see *Lathyrus* and *Vicia*.

Orontium—*Araceae*. Hardy aquatic perennial. First introduced mid-eighteenth century.

CULTURE: Soil, boggy. Position, margins of shallow ponds or rivulets or in water 12 in. deep. Plant, March to June, placing roots 6 to 12 in. below surface of water.

PROPAGATION: By division of rootstock in Oct. or March; seed sown in spring in shallow pans.

SPECIES CULTIVATED: *O. aquaticum*, 'Golden Club', yellow and white, glaucous leaves, May, 1 to 1½ ft., N. America.

Orphanidesia—*Ericaceae*. Evergreen shrub with large hirsute leaves, related to *Epigaea*.

CULTURE: Soil, well drained, lime-free. Position, considerable shade.

PROPAGATION: By seed.

SPECIES CULTIVATED: *O. gaultherioides*, pale pink with darker veins, low shrub with prostrate branches, Asia Minor.

Orphium—*Gentianaceae*. A monotypic genus, the species being an erect greenhouse shrub.

CULTURE: Compost, fibrous loam and peat with plenty of sharp sand and crock chippings. Position, well-drained pots in sunny greenhouse. Water

carefully at all times, especially in winter. Pot, March or April; the plants should never be over-potted, thriving best when grown in comparatively small receptacles. Temp., March to Oct. 50° to 55°, Oct. to March 45° to 50°.

PROPAGATION: By cuttings of the young side growths inserted in sandy peat under bell-glass or propagator in gentle heat during spring.

SPECIES CULTIVATED: *O. frutescens*, red, showy, summer, 1 to 2 ft., S. Africa.

Orris Root, see *Iris germanica* var. *florentina*.

Osage Orange, see *Maclura pomifera*.

Osier, see *Salix viminalis*.

Orychophragmus—*Cruciferae*. Hardy annual or biennial, sometimes placed in the genus *Moricandia*.

CULTURE: Soil, ordinary. Position, sunny.

PROPAGATION: By seed.

SPECIES CULTIVATED: *O. violaceus* (syns. *Moricandia sonchifolia*, *O. sonchifolius*), pale violet-blue, spring, 1 to 2 ft., China.

Osbeckia—*Melastomaceae*. Greenhouse herbs or sub-shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam and peat, sand and crushed charcoal. Position, well-drained pots or pans in warm greenhouse or stove. Water moderately in summer, carefully at other times. Temp., March to Oct. 60° to 70°, Oct. to March 55° to 60°.

PROPAGATION: By cuttings inserted during spring in pots of sandy soil, in warm propagating case, or under bell-glass.

SPECIES CULTIVATED: *O. chinensis*, purple, July, 2 ft., India; *glauca*, red or purple, July, 2 ft., India; *rostrata*, rosy pink, summer, 2 to 3 ft., Bengal; *stellata*, rosy purple, July and Aug., 2 ft., Himalaya.

Osmanthus (Fragrant Olive)—*Oleaceae*. Hardy and half-hardy evergreen flowering shrubs. *O. Delavayi* is now *Siphonosmanthus Delavayi*, which see. First introduced mid-eighteenth century.

CULTURE: Soil, loamy. Position, sheltered, sunny borders or against south or west walls. *O. fragrans* in sunny, unheated greenhouse. Plant, Sept., Oct. or April. Prune, when necessary, April, May. *O. ilicifolius* may be planted as a hedge or clipped formally.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Position, unheated, sunny greenhouse Sept. to June, outdoors June to Sept. Pot, Sept. or Oct. Water freely April to Oct., moderately other times. Temp., Sept. to May 40° to 50°.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in sandy peat in cold frame in spring or autumn; cuttings of firm young shoots in sandy soil under hand-light outdoors or in frame, in summer.

SPECIES CULTIVATED: *O. armatus*, creamy white, autumn, 8 to 15 ft., W. China; *Fortunei*, white, fragrant, autumn, 6 ft., hybrid; *Forrestii*, large leaves, white, summer, 15 ft., W. China; *fragrans* (syn. *Olea fragrans*), tender, powerfully fragrant, 6 to 10 ft., China and Japan; *ilicifolius* (syn. *O. Aquifolium*), white, Sept. to Oct., 10 to 20 ft., Japan, and numerous vars. See also *Osmarea*.

× **Osmarea**—*Oleaceae*. Bigeneric hybrid between *Siphonosmanthus* and *Phillyrea*. Hardy evergreen shrub.

CULTURE: Soil, ordinary. Position, open or partially shaded borders, excellent for hot dry soils. Makes good screen or useful clipped hedge. Plant, Sept., Oct. or April. Clip when required in May.

PROPAGATION: By cuttings of firm young shoots in well-drained sandy soil in shaded frame in Aug., Sept.

SPECIES CULTIVATED: *O. Burkwoodii*, white, April, very fragrant, hardy, 6 to 10 ft., English origin.

Osmaronia—*Rosaceae*. Hardy deciduous flowering shrub. Fragrant flowers

succeeded by purplish plum-like fruits. Previously known as *Nuttallia*. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, shady or sunny shrubberies. Plant, Oct. to Feb. Prune, when necessary, immediately after flowering.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in ordinary soil in shady position outdoors in spring or autumn; suckers removed from parent plant in Oct. or Nov.; cuttings of ripened shoots in cold frame in autumn; layering in autumn.

SPECIES CULTIVATED: *O. cerasiformis*, 'Osoberry', white, strongly almond-scented, March, 6 to 10 ft., California.

Osmunda—*Osmundaceae*. Greenhouse and hardy evergreen and deciduous ferns. Fronds, feather-shaped, plain or crested; fertile portions contracted.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts turfy loam and peat, little sand. Position, pots or beds in moist, shady part of greenhouse or fernery. Pot or plant, March or April. Water copiously April to Oct., moderately afterwards. Temp., 55° to 65° April to Sept., 45° to 55° Sept. to April.

CULTURE OF HARDY SPECIES: Soil, one part each loam, leaf-mould and sand, two parts peat. Position, bases of sheltered, moist rockeries or margins of ponds in shade or partial shade. Plant, April. Top-dress annually in April with compost of peat, leaf-mould and loam. Remove dead fronds in March. Water plants growing elsewhere than on the margins of ponds copiously in dry weather.

PROPAGATION: By spores sown on surface of sandy peat and leaf-mould in well-drained pans covered with sheet of glass or hand-light in shady part of cool greenhouse at any time; offsets from established plants in April.

GREENHOUSE SPECIES CULTIVATED: *O. javanica*, 2 to 4 ft., Java; *Mildei* (syn. *O. bipinnata*), 2 ft., Hong Kong.

HARDY SPECIES CULTIVATED: *O. cinnamomea*, 2 to 4 ft., N. America, E. Indies, etc.; *Claytoniana*, 2 to 3 ft., N. America and Himalaya; *gracilis*, a smaller, more slender plant than *O. regalis*, N. America; *regalis*, 'Royal Fern', 3 to 6 ft., Britain, etc., and numerous vars.

Osoberry, see *Osmaronia cerasiformis*.

Osteomeles—*Rosaceae*. Slightly tender evergreen shrubs. First introduced late nineteenth century.

CULTURE: Soil, loamy. Position, well-drained borders against sheltered wall with sunny aspect. In warmest counties in open border. Prune lightly after flowering.

PROPAGATION: By cuttings of half-ripened shoots during June and July, inserted in sandy soil under bell-glass in gentle bottom heat.

SPECIES CULTIVATED: *O. Schwerinae* (syn. *O. anthyllidifolia*), white, June, 8 to 10 ft., W. China, var. *microphylla*, a dainty dwarf form, probably hardier; *subrotunda*, white, June, 4 ft., China.

Ostrich Fern, see *Pteretis*.

Ostrowskia (Giant Bell-flower)—*Campanulaceae*. Hardy perennial flowering herb. First introduced late nineteenth century.

CULTURE: Soil, deep, sandy loam. Position, warm, sheltered border. Cover with hand-light after foliage has died down. Carrot-like roots penetrate the soil to a depth of 2 ft. Plant in March.

PROPAGATION: By seeds sown in light soil in a cold frame in spring. Seedlings take several years to flower.

SPECIES CULTIVATED: *O. magnifica*, mauve-lilac or white, summer, 4 to 5 ft., Cent. Asia.

Ostrya (Hop Hornbeam)—*Betulaceae*. Hardy deciduous trees closely resembling hornbeam. First introduced early seventeenth century.

CULTURE: Soil, ordinary moist. Position, by the side of streams, lakes, or in shrubberies in damp situations. Plant, Oct. to Feb.

PROPAGATION: By seeds stratified and sown outdoors in spring in sandy soil;

by cuttings inserted outdoors in autumn; by layering in summer; by grafting on the Hornbeam (*Carpinus Betulus*) in March.

SPECIES CULTIVATED: *O. carpinifolia*, greenish-white, May, 50 to 60 ft., S. Europe; *virginiana*, 'Iron-wood', greenish-white, May, 30 to 50 ft., N. America.

Oswego Tea-plant, see *Monarda didyma*.

Otaheite Apple, see *Spondias cytherea*; **-Gooseberry**, see *Phyllanthus acidus*.

Othonna (African Ragwort)—*Compositae*. Greenhouse trailing herb. First introduced mid-nineteenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and one part sand. Position, small well-drained pots or baskets suspended from roof. Pot, March or April. Water freely April to Oct., moderately afterwards. Apply stimulants to healthy plants occasionally during summer. Full exposure to light and sun essential.

PROPAGATION: By cuttings of shoots inserted in sandy soil in cool greenhouse or frame in summer; division of plants in April.

SPECIES CULTIVATED: *O. crassifolia*, yellow, summer, trailing, S. Africa.

Othonnopsis—*Compositae*. Half-hardy rock plant. First introduced mid-eighteenth century.

CULTURE: Soil, sandy loam. Position, warm, sunny rock gardens. Protect in severe weather.

PROPAGATION: By division in March or April or cuttings of young growth when three or four inches in length in sandy soil under bell-glass.

SPECIES CULTIVATED: *O. cheirifolia*, yellow, spring and summer, 1 ft., N. Africa.

Ourisia—*Scrophulariaceae*. Hardy perennial creeping herb. First introduced mid-nineteenth century.

CULTURE: Soil, moist, loamy. Position, partially shaded rockery, with its roots placed close to a lump of soft, porous stone. Plant, March or April. Water freely in dry weather. Must not be exposed to sunshine.

PROPAGATION: By division of roots in March or April.

SPECIES CULTIVATED: *O. caespitosa*, lilac, 1 to 2 in., summer, New Zealand; *coccinea*, scarlet, early summer, 9 in., Chile; *elegans*, commonly cult. as *O. coccinea*, much more robust grower than the true *O. coccinea*; *macrophylla*, white and lilac, summer, 6 to 9 in., New Zealand.

Our Lady's Thistle, see *Silybum Marianum*.

Oxalis (Wood Sorrel)—*Oxalidaceae*. Greenhouse and hardy annuals, herbaceous perennials and bulbous-rooted plants. *O. corniculata* can be a troublesome weed.

CULTURE OF GREENHOUSE SPECIES: Compost, sandy loam. Position, well-drained pots in sunny greenhouse or window. Pot autumn-flowering kinds in Aug.; winter-flowering kinds in Sept. or Oct.; spring-flowering kinds, Jan. or Feb., and summer-flowering kinds, March or April. Pot bulbs $\frac{1}{2}$ in. deep and $\frac{1}{2}$ in. apart in 5 in. pots. After potting place in warm part of greenhouse or window. Water moderately till leaves appear, then freely. Apply stimulants occasionally when flowers form. Gradually withhold water when flowers fade, and keep quite dry and cool till growth begins. Repot annually.

CULTURE OF HARDY SPECIES: Soil, sandy loam. Position, edgings to sunny borders or on rockeries. Cool, deep soil for *O. enneaphylla*. Plant *O. adenophylla* and *O. enneaphylla* Aug. to Nov., other species in March or April. Lift *O. floribunda* and *Deppei* in Sept. or Oct. Store in sand in cool, frost-proof place till March, then plant out.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light, sandy soil in temp. 55° to 65° in spring; division of roots or offsets at potting or planting time.

GREENHOUSE SPECIES CULTIVATED: *O. carnosa*, yellow, autumn, 6 in., Chile; *cernua*, 'Bermuda Buttercup', yellow, spring, 6 in., S. Africa, Europe; *hirta*, red, summer, 3 in., S. Africa; *rosea*, rose, spring, 6 to 8 in., Chile; *tetraphylla*, red, summer, 6 in., Mexico; *variabilis*, red, white, or crimson, autumn, 3 in.,

S. Africa. The following are bulbous-rooted: *O. cernua*, *floribunda*, *Deppei* and *tetraphylla*.

HARDY SPECIES CULTIVATED: *O. Acetosella*, 'Wood Sorrel', white, spring, 1 to 2 in., Britain, and var. *rosea*, pink; *adenophylla*, rose-pink, May to June, 3 in., Chile; *Bowieana*, rose-purple, autumn, 3 in., S. Africa; *corniculata*, yellow, creeping, all summer, Europe; *Deppei*, red, March, 6 in., S. America; *enneaphylla*, bluish-white, May to June, 2 to 3 in., Falkland Isles, and var. *rosea*; *floribunda*, rose, March, 9 in., Brazil, and var. *alba*; *lobata*, yellow, autumn, 3 in., Chile; *magellanica*, white, summer, 1 in., S. America; *montevidensis* (syn. *O. chrysantha*), yellow, all summer, 6 in., S. America; *oregana*, deep rose-red, May to June, 4 in., N. America; *valdiviensis*, yellow, summer, 4 to 6 in., Chile, often grown as an annual; *vespertilionis*, pink, summer, 6 in., Mexico.

Oxeye, see *Bupthalmum*; **-Chamomile**, see *Anthemis tinctoria*; **-Daisy**, see *Chrysanthemum Leucanthemum*.

Oxlip, see *Primula elatior*.

Oxycoccus, see *Vaccinium*.

Oxydendrum—*Ericaceae*. Hardy deciduous tree. First introduced mid-eighteenth century.

CULTURE: Soil, lime-free loam, peat and sand. Position, as specimens on lawns or in open places. Plant, Nov. to Feb.

PROPAGATION: By seeds sown during Feb. or March in well-drained pans in compost of sandy peat. Cover very lightly and place in greenhouse or frame.

SPECIES CULTIVATED: *O. arboreum* (syn. *Andromeda arborea*), 'Sorrel Tree', white, June to July, autumn tints, 10 to 30 ft., Eastern N. America.

Oxypetalum—*Asclepiadeae*. Stove and warm greenhouse evergreen climbers. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous peat, loam and sand. Position, well-drained pots; shoots trained up roof. Pot, March or April. Water freely in summer, moderately autumn and winter. Syringe morning and evening in springtime. Prune into shape, Feb. Repot, March. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown in sandy peat in a temp. of 75° in spring, or by cuttings placed in sand under a bell-glass over bottom heat in spring.

SPECIES CULTIVATED: *O. caeruleum* (syns. *Tweedia caerulea* and *T. versicolor*), blue, summer, fragrant, 3 ft., Argentina; *solanoide*s, blue, rose, orange, and purple, fragrant, summer, 6 ft., Brazil.

Oxytropis (Oxytrope)—*Leguminosae*. Hardy low perennial herbs or sub-shrubs.

CULTURE: Soil, dry, gravelly or sandy loam. Position, open, sunny rockeries. Plant, March or April. Lift and replant only when unhealthy.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in April or May where required to grow; division of roots in March.

SPECIES CULTIVATED: *O. campestris*, pale yellow and purple, July, 3 to 6 in., Northern and Arctic Regions (Scotland); *cyanea*, purple and blue, summer, 6 in., Caucasus; *Lambertii*, white, blue and purple, summer, 1 ft., N. America; *montana*, reddish-purple, July, 6 in., Alps; *pyrenaica*, purple and lilac, summer, 6 in., Pyrenees; *uralensis* (syn. *O. Halleri*), purple, summer, 4 in., Europe (Scotland).

Oyster Plant, see *Tragopogon porrifolius*.

Ozothamnus, see *Helichrysum*.

Pachyphragma—*Cruciferae*. Hardy herbaceous perennials suitable for carpeting thubbery or rock garden.

CULTURE: Soil, ordinary. Position, sun or shade.

PROPAGATION: By division; seed.

SPECIES CULTIVATED: *P. macrophyllum* (syns. *Thlaspi macrophyllum* and *T. latifolium*), white, May, leaves heart-shaped, 6 in., Caucasus.

Pachyphytum—*Crassulaceae*. Greenhouse succulent plants, sometimes included in the genus *Cotyledon*.

CULTURE: As *Echeveria*.

PROPAGATION: As *Echeveria*.

SPECIES CULTIVATED: *P. compactum*, reddish, 16 in., Mexico.

Pachysandra—*Buxaceae*. Hardy evergreen or deciduous procumbent subshrubs. First introduced early nineteenth century.

CULTURE: Soil, moist loam. Position, shady borders or rock gardens. Plant, Nov. to Feb.

PROPAGATION: By cuttings of nearly ripened growths in sandy soil under bell-glass in July or Aug.

SPECIES CULTIVATED: *P. procumbens*, greenish-white, March, 6 in., nearly deciduous, S.E. United States; *terminalis*, white, May, to 12 in., Japan, and var. *variegata*, leaves bordered and variegated with white, used for ground-cover.

Pachystachys—*Acanthaceae*. Warm greenhouse flowering and ornamental-leaved perennial.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand. Position, well-drained pots in light greenhouse; temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°. Prune shoots to 1 in. of base after flowering. Nip off points of young shoots occasionally May to Aug. to induce bushy growth. Apply liquid manure once a week to plants in flower.

SPECIES CULTIVATED: *P. coccinea* (syns. *Jacobinia coccinea*, *Justicia coccinea*), scarlet, summer, 3 to 6 ft., Trinidad and South America.

× **Pachyveria**—*Crassulaceae*. Bigeneric hybrids between *Echeveria* and *Pachyphytum*.

Paederota—*Scrophulariaceae*. Hardy rock garden plants.

CULTURE: Soil, well-drained gritty loam. Position, full sun.

PROPAGATION: By seeds; cuttings; division in spring.

SPECIES CULTIVATED: *P. Bonarota*, blue, summer, 4 to 6 in., Europe; *lutea* (syn. *P. Ageria*), yellow, summer, 4 to 6 in., Europe.

Paeonia (Peony; Paeony)—*Ranunculaceae* (or *Paeoniaceae*). Hardy herbaceous and shrubby perennials.

CULTURE: Soil, moist loam, well enriched with cow manure and trenched 3 ft. deep. Position, sunny or shady borders. Plant, Sept., Oct. or March, 4 ft. apart each way with 2 in. of soil over crown. Top-dress annually with decayed manure lightly forked in, Oct. or Nov. Mulch in April on dry soils. Apply liquid artificial manures occasionally April to Aug. Water copiously in dry weather. Shade blooms required for exhibition.

CULTURE OF TREE PEONIES: Soil, two parts loam, one part rotted cow manure. Position, sheltered nooks and sunny shrubberies or borders. Plant, Sept., Oct. or March. Bury point of union between stock and scion 3 in. below surface. Mulch in spring with thick layer of cow manure. Protect in severe weather with covering of litter. Plants flower three years after planting.

PROPAGATION: Herbaceous species by seeds in cold frame in Sept.; also by division of roots in Sept. or March. Tree species by grafting in Aug.; layering in Sept. or Oct.; offsets, March or April.

SPECIES CULTIVATED: *P. anomala*, crimson, May, 1 to 1½ ft., Europe, Russia, Cent. Asia, var. *intermedia* (syn. *P. intermedia*), similar; *arietina*, dark purplish-red, May, 1½ to 2 ft., S.E. Europe, Asia Minor; *Bakeri*, purplish-red, April to May, 2 ft., origin unknown; *Broteri*, purplish-red, May, 1 to 1½ ft., Spain, Portugal; *cambessedesii*, deep rose, April to May, 1 to 1½ ft., Balearic Isles; *Clusii* (syn. *P. cretica*), white, May, 9 to 12 in., Crete; *coriacea*, rose, April, 1½ ft., Spain, Morocco; *daurica* (syn. *P. triteranta*), purplish-rose, 1 to 2 ft., Crimea;

Delavayi, dark red, May, 5 ft., shrubby, W. China; *emodi*, white, May, 1 to 2 ft., W. Himalaya; *festiva* (syn. *P. officinalis*), double red, hybrid; *humilis*, purplish-rose, May, 1 ft., S.W. Europe; *lactiflora* (syns. *P. albiflora* and *P. edulis*), various, to 3 ft., Siberia, Manchuria, N. China, Mongolia; *Lemoinei*, shrubby, hybrid; *lutea* (syn. *P. Delavayi* var. *lutea*), yellow, June, 3 ft., shrubby, W. China, S.E. Tibet; *mascula* (syn. *P. corallina*), crimson, May, 3 ft., S. Europe, W. Asia; *Mlokosewitschii* (syn. *P. Mlokosiewiczii*), yellow, April, 3 ft., Caucasus; *officinalis* (syn. *P. feminea*), crimson, May, 2 to 3 ft., S. Europe; *obovata*, white to rose-purple, May, 1½ to 2 ft., S.E. Asia, var. *Willmottiae* (syn. *P. Willmottiae*), white; *peregrina* (syns. *P. decora*, *lobata* and *romanica*), deep red, to 2 ft., S.E. Europe, Asia Minor; *Potaninii* (syn. *P. Delavayi* var. *angustiloba*), deep maroon, W. China, and vars. *alba*, white, *trollioides*, yellow; *suffruticosa* (syns. *P. arborea* and *P. Moutan*), 'Tree Peony', rose, May, 3 to 6 ft., shrubby, China; *tenuifolia*, crimson, May, 1 to 1½ ft., Europe; *Veitchii*, purplish-red, to 2½ ft., China, var. *plena*, purplish-rose, *Woodwardii*, rose; *Wittmanniana*, yellow, May, 2 ft., Caucasus, and var. *tomentosa*.

Pak-Choi, see *Brassica chinensis*.

Paliurus—*Rhamnaceae*. Hardy deciduous flowering shrub with spiny branches and ornamental fruit. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, shrubberies or walls. Plant, Oct. to Nov.

PROPAGATION: By seeds sown ¼ in. deep in ordinary soil outdoors, Oct. to Nov.; cuttings of roots inserted 3 in. deep and 6 in. apart, Oct. to Feb.; layering shoots Sept. to Nov.; removing suckers with roots attached Sept. to Dec.

SPECIES CULTIVATED: *P. Spina-Christi* (syn. *P. aculeatus*), greenish-yellow, July, Aug., 15 to 20 ft., S. Europe to N. China.

Palma Christi, see *Ricinus communis*.

Palmetto, see *Sabal*.

Pampas Grass, see *Cortaderia*.

Panax (Ginseng)—*Araliaceae*. Low perennial greenhouse herbs with greenish flowers and berry-like fruits, grown for the roots which are employed in medicine.

CULTURE: Compost, equal parts loam, peat or leaf-mould, charcoal and sand. Pot, Feb. to March. Water freely March to Oct., moderately afterwards. Temp., March to Sept. 70° to 80°, Sept. to March 60° to 70°.

PROPAGATION: By grafting in heat in spring; roots-cuttings in light soil in temp. 80° in April.

SPECIES CULTIVATED: *P. quinquefolium* (syn. *Aralia quinquefolia*), 'American Ginseng', to 1½ ft., N. America; *Schinseng* (syn. *P. Ginseng*), 'Asiatic Ginseng', white bristles on veins of leaves, Manchuria, Korea; *trifolium* (syn. *Aralia trifolia*), 'Dwarf Ginseng', 'Groundnut', to 8 in., N. America.

Pancratium—*Amaryllidaceae*. Stove and hardy evergreen bulbous plants. First introduced late sixteenth century.

CULTURE OF STOVE SPECIES: Compost, two parts sandy loam, one part decayed manure and half a part silver sand. Position, well-drained pots in sunny part of stove. Pot, March. Repotting necessary every three or four years only. Water abundantly April to Sept., moderately Sept. to Dec., keep quite dry Dec. to March. Apply liquid manure once a week May to Sept. Temp., 70° to 80° March to Sept., 55° to 65° Sept. to March.

CULTURE OF HARDY SPECIES: Soil, three parts sandy loam, one part leaf-mould. Position, warm, exposed, well-drained borders. Plant bulbs 3 to 4 in. deep, Oct., Nov. or March. Protect in winter by layer of decayed manure, peat or cinder ashes. Mulch after growth commences with decayed cow manure. Apply weak stimulants occasionally during summer. Lift, divide and transplant every three years.

PROPAGATION: Greenhouse and stove species by offsets removed from old bulbs in March; hardy kinds similarly when replanting.

STOVE SPECIES CULTIVATED: *P. canariense*, white, Oct. and Nov., 18 in., fragrant, Canary Isles; *zeylanicum*, white, June, 1 ft., Trop. Asia.

HARDY SPECIES CULTIVATED: *P. illyricum*, white, summer, 1 to 2 ft., S. Europe; *maritimum*, 'Mediterranean Lily' or 'Sea Daffodil', white, June, 2 to 2½ ft., Medit. Region.

Pandanus (Screw Pine)—*Pandanaceae*. Stove evergreen shrubs with narrow, strap-like, serrated leaves. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part equal proportions leaf-mould, charcoal and sand. Pot, Jan. to April. Position, sunny, moist part of stove. Water moderately Oct. to Feb., freely afterwards. Syringe twice daily March to Sept. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By suckers, Feb. to April.

SPECIES CULTIVATED: *P. Baptistii*, leaves yellow and green, 4 to 6 ft., New Britain, and var. *variegata*; *Candelabrum*, leaves green, 15 to 30 ft., Trop. Africa; *furcatus*, leaves bright green, 10 to 15 ft., India, Malaya; *Sanderi*, leaves green and yellow, 3 ft., Timor; *utilis*, leaves glaucous green with reddish spines, 30 to 60 ft., Madagascar; *variegatus*, leaves green and white, 2 to 3 ft., Polynesia; *Veitchii*, leaves green and white, 3 ft., Polynesia.

Pandorea—*Bignoniaceae*. Greenhouse evergreen shrubs, climbing or clambering by tendrils and petioles. Funnel-shaped, white or pink flowers, and fruit an oblong pod, leaves pinnate.

CULTURE: Compost, two parts loam, one part peat and silver sand. Position, large well-drained pots or beds 3 ft. square 18 in. deep for one plant, in sunny greenhouse, shoots trained up roof. Pot or plant, Feb. or March. Good drainage essential. Prune in Feb. Water copiously April to Oct., keep nearly dry Oct. to April. Apply weak stimulants occasionally during summer to established plants. No shade required at any time. Admit air freely during summer and early autumn to thoroughly ripen wood. Temp., April to Oct. 55° to 65°, Oct. to April 40° to 50°.

PROPAGATION: By cuttings of young wood under glass; seed.

SPECIES CULTIVATED: *P. jasminoides* (syns. *Bignonia* and *Tecoma jasminoides*), 'Bower Plant', white with pink throat, Aug., 10 to 20 ft., Australia, var. *alba*, white, and *rosea*, pink; *pandorana* (syns. *P. australis*, *Bignonia* and *Tecoma australis*), 'Wonga-wonga Vine', yellowish-white spotted purple, summer, 10 to 20 ft., Australia, var. *rosea*, pale rose.

Panicum—*Gramineae*. Hardy and half-hardy annual and perennial grasses.

CULTURE OF HARDY ANNUALS: Soil, ordinary. Position, sunny borders. Sow seeds ½ in. deep in patches where required to flower, in March or April. Thin seedlings when 1 in. high to 2 in. apart. Gather inflorescence in July or Aug. and dry for winter use.

CULTURE OF HARDY PERENNIALS: Soil, good ordinary. Position, sunny borders. Plant, Oct. or April. Lift, divide and replant every two or three years.

PROPAGATION: Stove species by division; hardy kinds by seeds sown outdoors in April or May; division of roots in Oct. or March.

ANNUAL SPECIES CULTIVATED: *P. capillare*, 2 ft., W. Hemisphere.

PERENNIAL SPECIES CULTIVATED: *P. bulbosum*, 5 ft., Mexico; *virgatum*, 'Switch Grass', 3 to 4 ft., N. America. See also *Oplismenus*.

Pansy, see *Viola*.

Papaver (Poppy)—*Papaveraceae*. Hardy annual and perennial herbs.

CULTURE OF ANNUAL SPECIES: Soil, good ordinary. Position, sunny beds or borders. Sow seeds ⅛ in. deep in patches where required to grow—in April for flowering in summer, Sept. for flowering in spring. Thin seedlings to 1 or 2 in. apart when ½ in. high.

CULTURE OF PERENNIAL SPECIES: Soil, deep, sandy loam. Position, sunny borders for tall species, rockeries for *P. alpinum*. Plant, Oct., March or April.

Top-dress with decayed manure in March or April. *P. alpinum* and *nudicaule* are best grown as annuals or biennials.

PROPAGATION: Annual species by seeds as above; perennial species by seeds sown in sunny place outdoors in March or April; division of roots in March or April or root cuttings in winter.

ANNUAL SPECIES CULTIVATED: *P. glaucum*, 'Tulip Poppy', crimson, summer, 18 in., Syria; *laevigatum*, scarlet, black, and white, summer, 2 ft., Greece; *pavoninum*, 'Peacock Poppy', scarlet and black, 18 in., Afghanistan; *Rhoeas*, 'Corn' or 'Shirley Poppy', various colours, 18 in., Britain, and var. *umbrosum*, red and black; *somniferum*, 'Opium Poppy', various colours, summer, 3 ft., Europe and Asia.

PERENNIAL SPECIES CULTIVATED: *P. alpinum*, 'Alpine Poppy', yellow, orange, salmon, and white, summer, 6 in., Europe; *californicum*, orange, June, 1 ft., California; *nudicaule*, 'Iceland Poppy', yellow, orange, and white, summer, 1 ft., Arctic Regions; *orientale*, 'Oriental Poppy', orange-scarlet, June, 3 ft., Asia Minor; *pilosum*, orange, summer, 2 ft., Greece; *rupifragum*, 'Spanish Poppy', terra-cotta, summer, 2 ft., Spain.

Papaw, see *Asimina triloba*.

Papaya, see *Carica Papaya*.

Paper Mulberry, see *Broussonetia*; **-Bush**, see *Edgeworthia papyrifera*.

Paphinia—*Orchidaceae*. Small-growing epiphytic orchids at one time placed in *Lycaste*. Flowers large, beautiful, on short pendulous scapes from the base of the small, clustered pseudo-bulbs. Leaves two to three.

CULTURE: Compost, three parts of osmunda fibre or substitute, two parts sphagnum moss with finely broken crocks and nodules of charcoal. Small pans are preferable, suspended near the glass, the compost should be slightly mounded centrally. A moist atmosphere should be maintained. Water liberally when growth is vigorous, infrequently in winter. Careful shading is necessary and the syringe should not be used. Winter night temp. 60° to 65°, summer 70° and higher.

PROPAGATION: By division of plants when they are large enough, which is very seldom. When potting, in spring, a healthy back bulb may be removed and may emit a growth.

SPECIES CULTIVATED: *P. cristata*, yellowish, barred with chocolate, mid-lobe of lip purplish or chestnut with a tuft of white hairs, summer, autumn, Trinidad, Guiana, Brazil, var. *Randii*, reddish-brown, Brazil; *grandiflora* (syn. *P. grandis*), creamy white, purplish spotted and flushed, mid-lobe of lip with creamy white shaggy hairs, autumn, Brazil; *Lindeniana*, purplish, marked with creamy white, mid-lobe of lip white, with hair and teat-like processes; *rugosa*, yellow, dotted red, mid-lobe of lip red-purple with a tuft of white bristle-like hairs, autumn, Colombia.

Paphiopedilum—*Orchidaceae*. Terrestrial or epiphytic orchids without pseudo-bulbs. Some 3,000 hybrids have been raised from the species and between the hybrids themselves. Many are suited to a moderately cool temp. and many are winter flowering.

CULTURE: Compost for both species and hybrids; for the green-leaved kinds, e.g. *P. insigne*, three parts fibrous loam, one part peat or osmunda fibre, one part sphagnum moss. For the tropical green-leaved species and hybrids and those with mottled foliage, more moss and much less loam, crushed potsherds added to all. *P. niveum*, *concolor*, *bellatulum*, *Godefroyae*, should have fibrous loam, a little fibre and sphagnum and nodules of old mortar rubble. This section requires less frequent waterings in winter. About 2 in. of drainage is required by all. Temps., all enjoy a moist atmosphere and though *P. insigne*, *villosum*, *Spicerianum* and similar can grow in a winter night temp. of 50° to 55°, 60° is better as it allows rather more humidity. The more tender tropical species need a winter night temp. of 65° to 70°, 60° to 65° for species from Burma, Annam, etc. Temps. for hybrids

are governed by their parentage, 55° to 60° is sufficient for many, 60° is safer. These temps. will be exceeded in summer with shading and by sun heat, night air should be admitted whenever conditions are favourable.

PROPAGATION: By division of plants with not less than four growths, six are preferable.

SPECIES CULTIVATED: *P. Appletonianum* (syn. *P. sublaeve*, hort.), greenish-white, lilac-mauve, spring, summer, Siam; *Argus*, greenish, purple, veined brownish-purple, summer, Philippines; *barbatum*, greenish, white, striped and flushed brown-purple, summer, Malacca, many vars.; *bellatulum*, cream, spotted purple-maroon, spring, Burma, var. *album*, white; *callosum*, large, variable, white, purple striped, brown-purple, winter, summer, Siam, Cochin-China, var. *Sanderæ*, white; *Chamberlainianum*, greenish, petals spiralled, rose or greenish-rose, lip rose-purple, New Guinea; *Charlesworthii*, dorsal sepal suffused rose, summer, Burma; *ciliolare*, whitish, green veined, purplish-brown, spring, summer, Philippines, Malaya; *concolor*, small, 1 to 2, 5 in some vars., yellow, dotted red, summer, autumn, Siam, Burma; *Curtisii*, large, greenish-purplish, petals spotted, Sumatra, var. *Sanderæ*, whitish, green striped; *Dayanum*, greenish-white, dull rose, brownish-purple, summer, Borneo; *Druryi*, yellowish with black median lines, spring, early summer, Travancore; *exul*, yellowish, dorsal white-margined, Siam; *Fairieanum*, small, very pretty, whitish, purple striped and flushed, summer, winter, Assam; *glaucophyllum*, up to 20 in succession, greenish, dull purple, Java; *Godefroyæ*, whitish or yellowish, irregularly marked, brown-purple, lip with small spots, variable, summer, Cochin-China, Tonkin, var. *leucochilum*, lip without spots; *Gratrixianum*, near to *exul*, larger, dorsal black spotted, hybrid; *Haynaldianum*, 3 to 6 segments, narrow, rose, yellowish-green, brown-purple, spotted, spring, summer, Philippines; *hirsutissimum*, large, greenish shaded brown-purple, petals partially purplish, autumn, Annam, N. India; *Hookeræ*, yellowish-green to purplish, summer, Borneo, var. *Bullenianum* (syn. *P. Bullenianum*); *insigne*, variable, large, greenish, spotted on the white-margined dorsal with brown-purple, shading to brown, winter, N. India, Assam, Burma, of great use to hybridists, many named vars.; *javanicum*, greenish to brownish-green, summer, autumn, Java; *Lawrenceanum*, large, variable, white, striped purple-red, petals horizontal, greenish lip shaded brown-purple, summer, Borneo; *Lowii*, epiphytic, near to *Haynaldianum*, petals violet-purple apically, summer, Borneo; *Mastersianum*, greenish-yellow shading to copper, spring, summer, Amboina; *papuanum*, veined and shaded with dull crimson, summer, New Guinea; *Parishii*, 3 to 7 greenish-yellow, petals twisted, drooped, shading to brown, lip slender, summer, Moulmein; *philippinense* (syn. *P. Robelinii*), 3 to 5, dorsal, yellowish, striped brown-purple, petals twisted, tapered, black-warted, lip tawny to brown-green, summer, autumn, Philippines; *purpuratum*, white, shaded green, shading to purplish-red, dorsal striped, summer, Hong Kong; *Rothschildianum* (syns. *P. neoguinese*, *Nicholsonianum*), 2 to 7, large, dorsal yellowish, shaded white with blackish stripes, petals outstretched, tapered, lip reddish-brown, very fine, spring, summer, Sumatra, Borneo; *Sanderianum*, 3 to 5, yellowish, shaded green and brown-purple, petals ribbon-like, 18 to 27 in. long, summer, autumn, Malaya; *Spicerianum*, dorsal white with purplish median stripe, lip brownish-purple, winter, Assam; *Stonei*, 3 to 5 dorsal pink-flushed, striped black-crimson, petals twisted, tawny yellow, lip dull rose, autumn, Borneo; *superbiens* (syn. *P. Veitchianum*); *tonsum*, greenish-white, veined green, flushed brownish, summer, Sumatra; *venustum*, whitish, green veined, petals purple-flushed apically, lip yellowish, winter, N. India; *Victoriae Mariae*, many in succession, green shaded red, lip purplish-rose, summer, Sumatra; *villosum*, large, dorsal, white-margined, petals and lip yellow-brown, variable, winter, spring, Burma, Moulmein; *Wardii*, dorsal whitish, veined green, petals thickly spotted red-brown, autumn, winter, Upper Burma.

Paprika, see *Capsicum frutescens* var. *longum*.

Papyrus, see *Cyperus Papyrus*.

Paradisea—*Liliaceae*. Hardy herbaceous perennials. First introduced early seventeenth century.

CULTURE: Soil, ordinary, well enriched with leaf-mould and decayed manure. Position, partially shady borders. Plant, Oct. or March.

PROPAGATION: By division of roots in Oct. or March; seeds sown in cold frame or greenhouse in spring.

SPECIES CULTIVATED: *P. Liliastrum* (syn. *Anthericum Liliastrum*), 'St. Bruno Lily', white, fragrant, May and June, 1 to 2 ft., Alps, var. *major*, 4 to 5 ft., larger flowers than the parent.

Para Nut, see *Bertholletia*.

Paraquilegia—*Ranunculaceae*. Hardy herbaceous perennials.

CULTURE: Cool crevices or narrow ledges in the rock garden or in rich scree soil in a cool corner of the scree.

PROPAGATION: By seeds or careful division of old plants in spring.

SPECIES CULTIVATED: *P. anemonoides* (syns. *P. grandiflora*, *Isopyrum grandiflorum*), rich lavender-blue, summer, 6 to 9 in., Cent. Asia, China.

Paris—*Liliaceae*. Hardy perennial rhizomatous herb.

CULTURE: Soil, sandy loam. Position, shady borders, woods or shrubberies. Plant, Oct. to March.

PROPAGATION: By seeds sown in moist position outdoors in autumn; division of roots, Oct. or March.

SPECIES CULTIVATED: *P. quadrifolia*, 'Herb Paris', green, summer, 6 in., Britain.

Parlour Palm, see *Aspidistra lurida*.

Parnassia—*Saxifragaceae*. Hardy perennial herbs.

CULTURE: Soil, peaty or boggy. Position, moist, shady borders, bogs, or margins of streams or ponds. Plant, March or April.

PROPAGATION: By seeds sown in moist, boggy peat in shady position outdoors in autumn or spring; division of roots in March or April.

SPECIES CULTIVATED: *P. caroliniana*, white, summer, 6 in., N. America; *grandifolia*, white, summer, N. America; *palustris*, 'Grass of Parnassus', white and green, summer, 6 in., Britain.

Parochetus (Shamrock Pea)—*Leguminosae*. Hardy trailing herbaceous perennial. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, moist, partially shady banks or rock gardens. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light, sandy soil in cold frame in March; division of plants in March.

SPECIES CULTIVATED: *P. communis*, blue, March to June, trailing, Himalaya.

Paronychia (Nail-wort; Whitlow-wort)—*Caryophyllaceae*. Dwarf creeping perennial herbs. Flowers, white, surrounded by silvery bracts, produced in June. First introduced late nineteenth century.

CULTURE: Soil, ordinary. Position, dry, sunny banks or rockeries, or for carpeting surfaces of beds. Plant, March to June.

PROPAGATION: By seeds sown in sunny spot outdoors in March or April; division of plants, Oct. or March.

SPECIES CULTIVATED: *P. argentea*, trailing, S. Europe; *dichotoma*, trailing, Portugal; *nivea*, prostrate, S. Europe; *pyrenaica*, mat-forming, Pyrenees; *serpyllifolia*, trailing, S. Europe.

Parrotia—*Hamamelidaceae*. Hardy deciduous tree, leaves brilliantly coloured in autumn.

CULTURE: Soil, good ordinary. Position, open shrubberies or as lawn specimen. Plant, Oct. to Feb.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of sandy soil in cold frame in autumn or spring; layering shoots in autumn; cuttings.

SPECIES CULTIVATED: *P. persica*, to 15 ft., flowers, insignificant, before leaves, Persia.

Parrotiopsis—*Hamamelidaceae*. Hardy deciduous tree.

CULTURE: Soil, good ordinary. Position, open shrubberies, etc. Plant, Oct. to Feb.

PROPAGATION: By seeds, layers and cuttings of green wood under glass.

SPECIES CULTIVATED: *P. Jacquemontiana* (syn. *Parrotia Jacquemontiana*), leaves to 3 in. long, turning pale yellow in autumn, flowers in dense heads surrounded by large white bracts, to 20 ft., Himalaya.

Parrot's Bill, see *Clanthus puniceus*; **-Feather**, see *Myriophyllum proserpinacoides*.

Parsley, see *Petroselinum crispum*; **-Fern**, see *Cryptogramma crispa* var. *acrostichoides*.

Parsnip, see *Pastinaca sativa*.

Parson-in-the-Pulpit Orchid, see *Oncidium dastyle*.

Parthenocissus—*Vitaceae*. Shrubs, mainly deciduous, climbing by tendrils used to cover walls, fences and trees. Formerly included in genera *Ampelopsis* and *Vitis*.

CULTURE: Soil, ordinary. Position, against walls, etc. Plant, Oct. to March.

PROPAGATION: Hardwood cuttings Sept. under glass; spring, outdoors; soft-wood cuttings in moderate heat in summer.

SPECIES CULTIVATED: *P. Henryana* (syn. *Ampelopsis Henryana*), tall, leaflets bright green with silver and pink variegation colouring to red, China; *quinquefolia* (syn. *Ampelopsis quinquefolia*), 'Virginia Creeper', mid-America, var. *Englemannii*, better climber on bare walls; *tricuspidata* (syn. *Ampelopsis tricuspidata*), 'Japanese' or 'Boston Ivy', furnished with short-branched tendrils that can hold fast to any surface, var. *Veitchii* (syn. *Ampelopsis Veitchii*), 'Small-leaved Virginia Creeper', leaves purple when young, Japan.

Partridge Berry, see *Mitchella*.

Pasque Flower, see *Anemone Pulsatilla*.

Passerina—*Thymeliaceae*. Woody, prostrate or dwarf sub-shrubs for the rock garden.

CULTURE: Well-drained, gritty loam or scree soil, full sun.

PROPAGATION: By cuttings of ripened wood in Aug.

SPECIES CULTIVATED: *P. nivea*, yellow, fragrant, all summer, 1 to 2 in., Europe.

Passiflora (Passion Flower)—*Passifloraceae*. Stove, greenhouse and slightly tender climbing plants. *P. edulis* and *P. quadrangularis* produce edible fruit. First introduced early seventeenth century.

CULTURE OF STOVE SPECIES: Compost, equal parts loam and peat, one-fourth part silver sand. Pot, Feb. or March. Prune, Feb., thinning out weak shoots and shortening strong ones one-third. Position, well-drained tubs or pots, or beds 18 in. deep and 2 ft. wide; shoots trained up rafters or walls; sunny. Water copiously March to Sept., moderately afterwards. Syringe daily April to Sept. Apply stimulants occasionally to healthy plants when in flower. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

CULTURE OF GREENHOUSE SPECIES: Compost, as above. Position, grown in pots, tubs or beds, and shoots trained up rafters. Prune, pot and water as advised for stove species. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 50°.

CULTURE OF SLIGHTLY TENDER SPECIES: Soil, good ordinary, mixed with a little decayed manure. Position, south or south-west walls. Plant, Oct. or March. Prune in Feb., shortening small shoots. Water freely in dry weather. Apply liquid manure to healthy plants once a month in summer. Protect base of plant with straw or dry bracken during severe weather.

PROPAGATION: Stove and greenhouse species by seeds sown $\frac{1}{4}$ in. deep in pots of sandy soil in temp. 65° to 75° at any time; by cuttings of young shoots 4 to 6 in. long in sandy soil under bell-glass in temp. 65°, April to Sept. Half-hardy

species by similar cuttings in cold frame in summer; layering young shoots in summer.

STOVE SPECIES CULTIVATED: *P. alata*, crimson, white and purple, summer, 15 to 20 ft., Peru; *edulis*, 'Purple Granadilla', white and purple, summer, 20 ft., Brazil; *exoniensis*, red and pink, summer, 20 to 30 ft., hybrid; *quadrangularis* 'Giant Granadilla', red, violet and white, fragrant, summer, 20 ft., Trop. America; *racemosa* (syn. *P. princeps*), red, white and purple, summer, 20 ft., Brazil.

GREENHOUSE SPECIES CULTIVATED: *P. antioquiensis* (syn. *Tacsonia Van-Volxemii*), crimson, autumn, 30 ft., Colombia; *mixta* (syn. *Tacsonia mixta*), pink, summer, 20 ft., Trop. America; *mollissima* (syn. *Tacsonia mollissima*), rose, summer, 20 to 30 ft., Andes; *pinnatistipula* (syn. *Tacsonia pinnatistipula*), pale rose, Sept. 30 ft., Chile.

SLIGHTLY TENDER SPECIES CULTIVATED: *P. caerulea*, pale pink, white and purple, summer, 20 to 25 ft., Brazil, and vars.

Passion Flower, see *Passiflora*.

Pastinaca—*Umbelliferae*. Hardy biennial esculent-rooted vegetable.

CULTURE: Soil, rich ordinary, deeply dug and manured for the previous crop. Position, open and sunny. Sow when ground can be worked in March in drills 1 in. deep, 15 in. apart. Place seeds in groups of five at 9 in. intervals. Thin to leave sturdiest seedling at each station. Leave in ground until required for use, but lift when growth recommences and store in heaps of sand. In shallow soils prepare individual stations, making a hole with a crowbar and filling with good rich soil. Seed retains its vegetative powers for one year only. Quantity required for a row 50 ft. long, $\frac{1}{4}$ oz. Crop reaches maturity in 24 to 27 weeks, but flavour improves if left in the ground. Seed takes 15 to 20 days to germinate.

SPECIES CULTIVATED: *P. sativa* (syn. *Pencedanum sativum*), 'Parsnip', yellow, July and Aug., 4 ft., Europe.

Patrinia—*Valerianaceae*. Hardy perennials with graceful foliage and attractive flowers. First introduced mid-eighteenth century.

CULTURE: Soil, light, rich, ordinary. Position, sunny borders. Plant in Oct., March or April. Grow in groups of three or six.

PROPAGATION: By seeds sown outdoors in April; division of the plants in autumn or spring.

SPECIES CULTIVATED: *P. intermedia*, yellow, fragrant, May, 1 ft., Siberia; *scabiosifolia*, 'Eastern Valerian', yellow, June and July, 2 ft., Siberia; *triloba*, June and July, 9 in., Japan.

Paullinia—*Sapindaceae*. Stove evergreen twining plant with finely divided, green, downy leaves. First cultivated early nineteenth century.

CULTURE: Compost, two parts loam, one part each leaf-mould and sand. Position, well-drained pots, with shoots trained round wire trellis or up rafters of roof. Pot, March. Prune slightly in Jan. and Feb. Water moderately Oct. to Feb., freely afterwards. Syringe twice daily March to Sept.

PROPAGATION: By cuttings of firm shoots, 2 to 3 in. long, inserted in small pots of sandy soil under bell-glass in temp. 75° to 85° any time.

SPECIES CULTIVATED: *P. thalictrifolia*, pink, Sept., 10 to 15 ft., Brazil.

Paulownia—*Scrophulariaceae*. Hardy deciduous tree with ornamental foliage and foxglove-shaped flowers of striking beauty. First introduced mid-nineteenth century.

CULTURE: Soil, rich well-drained loam. Position, sunny, sheltered shrubberies or lawns. Plant, Oct. to Feb. Prune shoots annually in Feb. to within 2 or 3 in. of base if only foliage is desired; leave unpruned for flowering.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in sandy loam in cold frame in spring or autumn; cuttings of roots inserted in sandy soil in frame in Feb.

SPECIES CULTIVATED: *P. lilacina*, pale violet striped pale yellow, June, 30 to 50 ft., W. China; *tomentosa* (syn. *P. imperialis*), violet, June, 30 to 50 ft., China.

Pavetta—*Rubiaceae*. Stove and greenhouse evergreen shrubs. First introduced late eighteenth century.

CULTURE: Compost, two parts good fibrous peat, one part fibrous loam and silver sand. Position, shady part of warm greenhouse whilst growing, light situation when at rest. Pot, Feb. or March; good drainage indispensable. Prune into shape in Feb. Water freely from March to Sept., moderately afterwards. Syringe twice daily March to Aug. Apply liquid manure once or twice a week to healthy plants in flower. For *P. caffra*, March to Sept. 60° to 70°, Sept. to March 50° to 55°.

PROPAGATION: By cuttings of firm young shoots, 2 to 3 in. long, inserted singly in small pots in sandy peat under bell-glass in temp. 75° to 85°, March to May.

SPECIES CULTIVATED: *P. caffra*, white, June to Aug., 3 to 4 ft., Cape of Good Hope; *indica*, white, Aug. to Oct., 3 to 4 ft., Trop. Asia, Trop. Australia; *obovata*, white, summer, 3 ft., Natal.

Pavia, see *Aesculus Pavia*.

Pavonia—*Malvaceae*. Stove evergreen plants. First introduced mid-eighteenth century.

CULTURE: Compost, two parts loam, one part peat and sand. Pot, March. Position, pots in shade. Water freely March to Sept., moderately afterwards. Syringe daily in summer. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings in fine sand under bell-glass in temp. 75° at any time.

SPECIES CULTIVATED: *P. intermedia*, white, origin unknown, var. *kermesina*; *multiflora* (syn. *P. Wioti*), purple, autumn, 1 to 2 ft., Brazil; *rosea*, rosy red, 1 to 2 ft., Trop. America; *spinifex*, yellow, 10 to 20 ft., Trop. America.

Pawpaw, see *Carica Papaya*.

Pea, see *Pisum sativum*; -**Tree**, see *Caragana*.

Peanut, see *Arachis hypogaea*.

Peach, see *Prunus Persica*.

Peacock Flower, see *Delonix regia*.

Pear, see *Pyrus*.

Pearl Berry, see *Margyricarpus setosus*; -**Bush**, see *Exochorda*; -**Grass**, see *Briza maxima*; -**wort**, see *Sagina*.

Pecan, see *Carya Pecan*.

Pearly Everlasting, see *Anaphalis margaritacea*.

Pedilanthus—*Euphorbiaceae*. Stove succulent shrub. First introduced mid-nineteenth century.

CULTURE: Compost, two parts sandy loam, one part brick rubbish, half a part decayed cow manure and silver sand. Pot, March or April. Position, dry, sunny part of stove. Temp., Sept. to March 60° to 70°, March to Sept. 60° to 80°. Water once in three weeks from Sept. to March, once a week afterwards. No syringing or stimulants required.

PROPAGATION: By cuttings of shoots, 2 to 3 in. long, exposed to sun for one or two days, then inserted singly in sand in 2 in. pots, and placed on a shelf near the glass, any time during summer.

SPECIES CULTIVATED: *P. macrocarpus*, bright red, 5 ft., California; *tithymaloides*, 'Jew Bush', 'Slipper Spurge', bright red or purple, 6 ft., Trop. America, also var. *variegatus*.

Pediocactus—*Cactaceae*. Greenhouse succulent plant, sometimes included in *Echinocactus*.

CULTURE: As *Echinocactus*.

PROPAGATION: As *Echinocactus*.

SPECIES CULTIVATED: *P. Simpsonii*, 'Snowball Cactus', pinkish, radial spines white and needle-like, hardy species, can be grown out of doors in S. England, Mexico.

Pelargonium—*Geraniaceae*. Greenhouse and hardy herbaceous, evergreen, shrubby and tuberous-rooted perennials. Flowering and ornamental foliage. Popularly known as 'Geraniums'. First introduced eighteenth century.

CLASSIFICATION OF TYPES: (1) Zonal: Leaves roundish, cordate, lobed, pubescent, green, with or without zone or horse-shoe mark near margin of upper surface. Subclasses: Bicolor—Leaves green edged with white or white edged with green. Tricolor—Leaves green, white, yellow and crimson. Bronze—Yellow, with bronze zone. (2) Show: Leaves palmately lobed, toothed margins, wrinkled, green; flowers large, with smooth or wrinkled edges. Subclass: Regal—Flowers semi-double. (3) Fancy: Leaves similar to show kinds; flowers smaller, spotted, or blotched. (4) Ivy-leaved: Leaves ivy-shaped, fleshy, five-angled, green or variegated; stems trailing or climbing. (5) Scented-leaved: Leaves variously shaped, scented. (6) Succulent: Stems fleshy, often contorted, leaves variously shaped, often with glandular teeth.

CULTURE OF HARDY HERBACEOUS SPECIES: Soil, sandy loam. Position, sunny well-drained rockery or border. Plant, March or April. Protect in winter with covering of coconut-fibre refuse.

CULTURE OF ZONAL PELARGONIUMS: For summer flowering: Insert cuttings in Aug. or Sept. singly in 2 in. pots. Place in temp. 45° till March, then transfer to 4 in. size. Nip off points of main shoot in Feb. or March, also of side shoots when 2 in. long. Transfer to 6 in. pots when roots reach side of 5 in. sizes. Pot firmly. Compost for first potting, two parts yellow fibrous loam, half a part well-decayed manure, half a part leaf-mould, one part coarse sand, and tablespoonful of superphosphate or a quarter of a pint of bonemeal to each bushel; for final potting, same proportion of loam, manure and leaf-mould, quarter part each of coarse sand and charcoal, tablespoonful of superphosphate or pint of bonemeal to each bushel. Remove flower buds until fortnight after final potting. Water moderately first ten days after potting, freely afterwards. Apply stimulants month after final potting. Shade from sun when in bloom. Temp., Aug. to March 40° to 50°, March to May 55° to 60°; ordinary cool greenhouse or window afterwards. After flowering shorten shoots and keep soil just moist, repotting following spring to make large plants. For winter flowering: Insert cuttings singly in 2 in. pots in Feb. or March in temp. 55° to 65°. Transfer when well rooted into 4 in. and again into 6 in. in June. Nip off points of main shoot in April and of side shoots in May or June. Pinch off flower buds appearing before Sept. Stand in sunny, cold frame or plunge to rim of pots in cinder ashes in open position, June to Sept. Remove into greenhouse in Sept. Water freely outdoors, moderately indoors. Apply stimulants twice a week June to Sept., once a week afterwards. Compost, as above. Temp., Sept. to March 50° to 55°. Dry atmosphere essential to prevent damping of blooms. After flowering shorten shoots, keep moderately moist, and repot. Zonals, Bicolors and Tricolors for bedding: Insert cuttings in Aug. or Sept., several in 5 in. pots, or 2 in. apart in shallow boxes. Keep thus until Feb., then transfer singly to 3 in. pots, place in temp. 55° until April, then remove to cold frame, and plant outdoors in June. Lift plants in Sept., placing bicolors, tricolors and bronzes singly in 3 in. pots; zonals singly in similar pots, three in a 4 or 5 in. pot, or a few inches apart in shallow boxes, and storing in temp. 40° to 45°, in greenhouse, room or cellar. Specimen Zonals: Insert cuttings in Aug. or Sept., grow in 2 in. pots until March, then transfer to 4 in. sizes. Compost, as above. Nip off point of main shoot in March, also of side shoots when 3 in. long. Tie these firmly to wire fixed to rim of pot and allow young shoots to form in centre. Remove all blooms first year. Transfer to 6 in. pot in May or June. Grow in greenhouse near glass. Water freely during summer, moderately in winter. Apply stimulants June to Sept. Shorten shoots two-thirds in Jan. When new shoots form repot. Nip off points of shoots where necessary to ensure

good shape. Compost, as above. Stimulants for Zonals: Liquid horse, cow, sheep or deer dung diluted with two-thirds water and applied twice a week in summer, once a week in winter; nitrate of soda, $\frac{1}{4}$ oz. to a gallon of water, applied once a week, when soil is moist only, for three or four weeks, then cease; sulphate of ammonia, same as nitrate of soda; soot-water (one peck each of sheep and cow dung and $\frac{1}{2}$ peck of soot to 36 gall. of water), diluted with half water, applied twice a week.

CULTURE OF SHOW AND FANCY PELARGONIUMS: Insert cuttings of firm shoots, 2 to 3 in. long, in July or Aug., singly in 2 in. pots in cold frame or greenhouse. Sandy soil. When rooted transfer to 4 in. pots, and place on a shelf close to glass in temp. 45° to 50° . Nip off point of main shoot just before potting. When new shoots are 3 in. long nip off points. Transfer to 5 in. pots in Jan. Keep near glass. When flowers show apply liquid manure twice a week. Water moderately until March, then freely until June, when give less. Temp., Sept. to March 45° to 50° , March to May 50° to 55° . After flowering stand in sunny place outdoors. Prune shoots to within 1 in. of base in July. When new shoots form turn plants out of pots, remove loose soil, and repot in 4 or 5 in. pots. Replace in greenhouse in Sept. Transfer to 6 or 8 in. pots in Dec. or Jan. Compost, three parts good fibrous loam, one part decayed horse or cow dung, half a part coarse sand, and a tablespoonful of superphosphate to each bushel. Good drainage and firm potting essential. Stimulants as above.

CULTURE OF IVY-LEAVED PELARGONIUMS: Insert cuttings singly in 2 in. pots, or three or four in a 4 in. pot, in Aug. or Sept. Grow in greenhouse near glass until Feb. or March, then transfer to 4 in. pots. Nip off points of main shoots in Feb. or March. Repot in 5 in. pots in April or May. Train shoots to stakes or place plants in suspended baskets, and let them droop over sides. Water moderately Sept. to April, freely April to Sept. Apply stimulants May to Sept. Temp., Sept. to March 40° to 50° , March to Sept. 50° to 60° . Plant outdoors June. Prune old plants Feb. or March. Compost and stimulants as for zonals.

CULTURE OF FRAGRANT-LEAVED PELARGONIUMS: Compost, two parts loam, half a part each of decayed manure and leaf-mould, quarter part sand. Pot and treat as advised for zonals.

CULTURE OF SUCCULENT PELARGONIUMS: Compost, two parts sandy loam, half part crushed brick with plenty of sharp sand. Position, greenhouse with full exposure to sun. Water sparingly, little in winter.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in a well-drained pot or pan filled with light, sandy soil in temp. 55° to 65° , Feb. to April; cuttings inserted as above directed in each section; grafting on common kinds in close frame or under bell-glass in temp. 55° to 65° in spring; tuberous-rooted kinds by division in spring.

HARDY HERBACEOUS SPECIES CULTIVATED: *P. Endlicherianum*, rose, July to Oct. 2 ft., Orient.

FRAGRANT-LEAVED SPECIES CULTIVATED: *P. capitatum*, 'Rose-scented', rose and purple, summer, 2 to 3 ft., S. Africa; *citriodorum*, 'Citron-scented', white, summer, 2 to 3 ft., hybrid; *crispum*, 'Lemon-scented', rose, Sept., 2 to 3 ft., S. Africa; *denticulatum*, purple, summer, 1 ft., S. Africa, and var. *filicifolium*, 'Fern-leaved'; *fragrans*, 'Nutmeg-scented', white and pink, summer, 2 to 3 ft., S. Africa; *graveolens*, rose and purple, 2 to 3 ft., S. Africa; *odoratissimum*, white, $1\frac{1}{2}$ ft., S. Africa; *quercifolium*, 'Oak-leaved', pink and purple, May, 3 ft., S. Africa; *Radula*, 'Balsam-scented', rose and purple, summer, 2 to 3 ft., S. Africa; *tomentosum*, 'Peppermint-scented', white, summer, 3 ft., S. Africa.

SUCCULENT SPECIES CULTIVATED: *P. ardens*, scarlet shaded crimson, stem thick, suffruticose, 1 ft., S. Africa; *Bowkeri*, yellow and purple, stem short, 18 in., S. Africa; *dasycaule*, creamy white, 18 in., S. Africa; *echinatum*, white spotted red, stem fleshy, armed with spine-like stipules, S. Africa; *Gibbosum*, greenish-yellow, stem gouty and swollen at the distant nodes, 18 in., S. Africa; *Stapletonii*, pinkish-white, 18 in., a hybrid with *echinatum*; *tetragonum*, pale pink, stems square and fleshy, 2 ft., S. Africa; *triste*, brownish-yellow with dark spots, stem short, S. Africa, and vars. *daucifolium* (syn. *P. millefoliatum*) and *filipendulifolium*.

OTHER SPECIES CULTIVATED: *P. grandiflorum*, white and red, summer, 2 ft., S. Africa; *inquinans*, scarlet, rose, or white, summer, 2 ft., S. Africa; *keuensis*, scarlet, 1 ft., origin unknown; *peltatum* (syn. *hederaefolium*), parent of the Ivy-leaved Geraniums, white and red, summer, S. Africa; *salmonium*, salmon pink, 1½ ft., S. Africa; *zonale*, 'Horseshoe' or 'Zonal Geranium', parent of the zonal, bicolor and tricolor geraniums, various colours, summer, 2 ft., S. Africa. The bedding and zonal pelargoniums of gardens are hybrids between *P. inquinans* and *P. zonale*.

Pelecyphora—*Cactaceae*. Greenhouse succulent perennial. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy loam, rough old mortar and pounded bricks. Position, sunny, airy greenhouse or windows. Pot, March or April in well-drained pots just large enough to accommodate roots. Repot every third or fourth year only. Water moderately March to Sept., once a fortnight Sept. to Dec., none afterwards. Syringe on evenings of warm days June to Sept. Apply soot-water to healthy plants June to Sept. Ventilate freely in summer. Temp., March to Sept. 60° to 70°, Sept. to March 50° to 55°.

PROPAGATION: By seeds sown ½ in. deep in well-drained pans or pots of sandy soil in temp. 75° in March, keeping soil moderately moist; by cuttings of the tops of the plants inserted in small pots of sandy, gritty compost in spring.

SPECIES CULTIVATED: *P. aselliformis*, 'Hatchet Cactus', white and rose, June, 4 in., Mexico.

Pelican Flower, see *Aristolochia grandiflora*.

Pellaea (Cliff Brake Fern)—*Polypodiaceae*. Greenhouse evergreen and deciduous ferns, embracing species formerly named *Platyloma*. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand, with a little charcoal and sandstone. Pot or plant, March. Position, well-drained pots in shady part of greenhouse or in beds or rockeries in shade. Water moderately Oct. to Feb., freely afterwards. Temp., Sept. to March 45° to 55°, March to Sept. 60° to 65°. *P. atropurpurea* is sufficiently hardy to grow outside in sheltered rockeries if protected with litter or hand-light in winter.

PROPAGATION: By spores sown on surface of sandy peat in shallow pan in temp. 70° or 80° any time; division of plants in Feb. or April.

SPECIES CULTIVATED: *P. atropurpurea*, 1 ft., N. America; *Breweri*, 10 in., N. America; *dealbata*, N. America; *flexuosa*, fronds much branched, Colombia; *falcata*, to 1½ ft., India to New Zealand; *hastata* (syn. *P. calomelanos*), 2 ft., S. Africa; *rotundifolia*, good basket fern, to 1 ft., New Zealand; *tenera*, fronds blue-green, Chile; *ternifolia*, Trop. America; *viridis* (syn. *P. adiantoides*), 2 ft., Africa.

Pellionia—*Urticaceae*. Stove creeping herbs. Cultivated in greenhouses for their attractive coloured stems. First introduced late nineteenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Pot or plant, March or April. Position, shallow pans, or on surface of beds or rockeries or under staging. Water moderately Oct. to Feb., freely afterwards. Temp., Sept. to April 55° to 65°, April to Sept. 65° to 75°.

PROPAGATION: By cuttings of creeping shoots inserted in sandy soil in small pots under bell-glass in temp. 75° to 85° in spring; division of plants in March or April.

SPECIES CULTIVATED: *P. Daveauana*, Cochin-China; *Heyneana*, India; *pulchra*, Cochin-China.

Peltandra (Arrow Arum)—*Araceae*. Hardy perennial herbs with spearhead-shaped, broad, deep green leaves. First introduced mid-eighteenth century.

CULTURE: Soil, rich, boggy or muddy. Position, moist bog or shallow pond. Plant, March or April, enclosing roots and small quantity of soil in piece of canvas or sacking and dropping the whole into the water.

PROPAGATION: By division of roots in spring.

SPECIES CULTIVATED: *P. alba*, white, red berries, June, 18 in., E. America; *virginica*, green, green berries, June to July, 12 to 24 in., N. America.

Peltaria—*Cruciferae*. Hardy herbaceous perennial herb. Plant garlic-scented. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, sunny borders, beds or rockeries. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors, March or April, where plants are required to grow; division of plants in March or April.

SPECIES CULTIVATED: *P. alliacea*, white, summer, 1 ft., E. Europe.

Pendulous Bellflower, see *Symphyandra*.

Pennisetum—*Gramineae*. Hardy perennial grasses. Sometimes known as *Gymnothrix*. Inflorescence very graceful and useful for cutting and drying for winter decoration.

CULTURE OF *P. LATIFOLIUM*: Soil, sandy loam. Position, sheltered, well-drained borders in warm parts of the country only. Plant, April. Protect in severe weather with covering of mats, or lift in Nov., place in large pots or tubs, and remove to greenhouse, replanting outdoors in April or May.

CULTURE OF *P. VILLOSUM*: Soil, ordinary. Position, sunny borders. Sow seeds $\frac{1}{16}$ in. deep in patches a foot or more in diameter, in March or April, where plants are to flower. Gather inflorescence for winter use, end of July. This species is best treated as an annual.

PROPAGATION: *P. latifolium* by seed sown $\frac{1}{16}$ in. deep in sandy soil in shallow boxes or pans in temp. 60° to 65°, March or April, transplanting seedlings outdoors in May or June; division of root in April.

SPECIES CULTIVATED: *P. latifolium* (syn. *Gymnothrix latifolia*), 5 to 8 ft., Argentina; *villosum* (syn. *P. longistylum*), 12 to 18 in., Abyssinia.

Pennyroyal, see *Mentha Pulegium*.

Penstemon (Beard Tongue)—*Scrophulariaceae*. Hardy perennials, formerly spelled Pentstemon. First introduced late eighteenth century.

CULTURE: Soil, two parts rich loam, one part decayed manure or leaf-mould. Plant, March or April. Position, sunny beds or borders, well drained. Apply stimulants once or twice a week in summer. The kinds grown so largely in gardens were originally derived from hybrids between *P. Cobaea* and *P. Hartwegii*.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in a well-drained pot or pan of light soil in temp. 55° to 65° in Feb. or March, transplanting seedlings outdoors in May; cuttings of young shoots, 3 in. long, inserted in sandy soil in boxes or a bed under hand-light, or in cold frame in Aug., allowing them to remain there until April; division in April.

SPECIES CULTIVATED: *P. angustifolia*, mauve or soft blue, July, 8 to 12 in., Western U.S.A.; *antirrhinoides*, lemon-yellow, July, 1 to 3 ft., S. California; *azureus*, blue, Aug., 1 ft., N. America; *barbatus* (syn. *Chelone barbata*), scarlet, summer, 3 ft., U.S.A.; *Bridgesii*, scarlet, July to Sept., 1 to 2 ft., N. America; *campanulatus*, rosy purple, violet, or white, June, 1 to 2 ft., Mexico and Guatemala; *centranthifolius*, scarlet, summer, 1 to 3 ft., California and W. Arizona; *Cobaea*, purple or white, Aug., 1 to 2 ft., U.S.A.; *confertus*, yellow, 1 ft., summer, Rocky Mountains; *cordifolius*, scarlet, summer, partially climbing, S. California; *diffusus*, blue or purple, summer, 1 to 2 ft., Western N. America; *Digitalis*, white or pink, 2 to 3 ft., U.S.A.; *Edithae*, rose-purple, May, 6 to 9 in., hybrid; *glaber* (syn. *P. Gordonii*), purple, summer, 1 to 2 ft., U.S.A., and vars. *alpinus* and *cyananthus*; *Hartwegii*, scarlet, summer, 2 ft., Mexico; *heterophyllus*, pinkish to sky blue, July, 1 to 3 ft., California; *hirsutus* (syn. *P. pubescens*), purple or violet, July, 1 to 3 ft., U.S.A.; *laevigatus*, 2 to 3 ft., U.S.A.; *Menziesii*, purple, June, 6 in., N.W. America; *ovatus*, blue to purple, Aug. to Oct., 2 to 3 ft., U.S.A.; *Richardsonii*, violet, summer, 1½ to 2 ft., U.S.A.; *rupicola*, ruby red, May, 2 to 3 in., N.W. America; *Scouleri*, lilac, May to June, 1 to 2 ft., U.S.A.; *spectabilis*, rose-purple or lilac, summer, 2 to 4 ft., Mexico and S. California.

Pentaglottis—*Boraginaceae*. Hardy perennial herb, formerly included in *Anchusa* but with botanical differences, sometimes known as *Caryolopha*.

CULTURE: As *Anchusa*.

PROPAGATION: As *Anchusa*.

SPECIES CULTIVATED: *P. sempervirens* (syn. *Anchusa sempervirens*), rich blue, spring and summer, to 2 ft., Europe.

Pentas—*Rubiaceae*. Stove evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous peat and leaf-mould, half part each light loam and sand. Pot, Feb. to April. Position, well-drained pots in light part of stove. Water moderately Sept. to April, freely at other times. Syringe daily April to Sept. Prune plants into shape immediately after flowering. Nip off points of young shoots occasionally during May, June and July to induce bushy habit of growth. Temp., Sept. to April 50° to 60°, April to Sept. 60° to 75°.

PROPAGATION: By cuttings of young shoots, 2 to 3 in. long, inserted singly in 2 in. pots filled with sandy compost and placed under bell-glass in temp. of 75°, spring or summer.

SPECIES CULTIVATED: *P. coccinea*, scarlet, spring, 18 in., Trop. Africa; *lanceolata* (syn. *P. carnea*), pink, winter, 18 in., Trop. Africa, var. *alba*, white; *parviflora*, orange-red, spring, 2 ft., Trop. Africa.

Peony, see *Paeonia*.

Peperomia—*Piperaceae*. Stove herbaceous creeping or erect perennials. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous loam and peat with half a part sand. Pot, March or April. Position, small well-drained pots for erect species, shallow pans or beds for creeping species. Shade from sun. Water moderately in winter, freely in summer. Syringe daily April to Sept. Temp., April to Sept. 60° to 75°, Sept. to April 55° to 65°.

PROPAGATION: By cuttings of shoots or single joints with leaf attached inserted in sandy peat and plunged in bottom heat in temp. 65° to 75° in spring.

SPECIES CULTIVATED: *P. argyroneura*, leaves green and silver striped, Brazil; *brevipes*, leaves brown and light green, Trop. America; *maculosa*, leaves bright green, W. Indies; *metallica*, leaves green, Peru; *obtusifolia*, flowers red, leaves green with dark red margins, Trop. America; *rotundifolia* (syn. *P. nummulariaefolia*), round, green leaves, Trop. America.

Pepper, see *Piper* and *Capsicum*; -**mint**, see *Mentha piperita*; -**Tree**, see *Schinus*.

Pereskia—*Cactaceae*. Stove succulent perennials. First introduced late seventeenth century.

CULTURE: Compost, equal parts loam, peat and leaf-mould, one-fourth sand. Pot, March. Position, small well-drained pots in light, dry part of stove, or in beds with shoots trained to dry wall. Water moderately Sept. to April, freely afterwards. Temp., Sept. to March 50° to 60°, March to Sept. 65° to 75°. *P. aculeata* and *P. Bleo* grown chiefly for stocks for grafting epiphyllums, zygocactus, etc.

PROPAGATION: By cuttings of stem inserted in 2 in. pots filled with sandy soil and placed on a light, dry shelf in temp. 65° to 75° in spring. Allow one shoot only to grow for forming a stock, and train this to a stake fixed in soil until high enough, then graft.

SPECIES CULTIVATED: *P. aculeata*, 'Barbados Gooseberry', 10 to 30 ft., W. Indies; *Bleo*, 10 to 15 ft., Mexico; *grandifolia*, 6 ft., usually cultivated under the name *P. Bleo*, Brazil.

Perilla—*Labiatae*. Half-hardy annual, cultivated for its attractive coloured foliage, something like *Coleus*. First introduced mid-eighteenth century.

CULTURE: Sow seeds $\frac{1}{8}$ in. deep in shallow boxes or pans filled with ordinary

light soil placed in temp. 65° to 75° in Feb. or March. Transplant seedlings, when three leaves have formed, singly into 2 in. pots, or 2 in. apart in shallow boxes. Keep in temp. 55° to 65° till May, then transfer to cold frame; gradually harden off and plant outdoors in June. Suitable for masses in borders or for lines in, or edgings to, beds.

SPECIES CULTIVATED: *P. frutescens crispa* (syn. *P. nankinensis*), leaves bronzy purple, 1 to 3 ft., China, Japan and Himalaya.

Periploca—*Asclepiadaceae*. Hardy deciduous twiner of little beauty. Quaint 5 in. narrow fruits in pairs with silky tassels. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Position, walls, arbours, summer-houses, or trellises in any aspect. Plant, Oct., Nov., Feb. or March. Prune away very weak or old distorted shoots only in March.

PROPAGATION: By cuttings inserted under bell-glass or hand-light outdoors, July to Oct.; layering shoots, Sept. or Oct.

SPECIES CULTIVATED: *P. graeca*, 'Silk Vine', green and brown, fragrant, July to Aug., 20 to 30 ft., S.E. Europe.

Peristeria (Dove Orchid)—*Orchidaceae*. The common name is from the dove-like shape assumed by the beaked column and basal lobes of the lip. An epiphytic genus. Pseudo-bulbs rather large and rounded. Spikes erect, arched or descending, from base of bulbs. Flowers moderately large, fleshy, not widely spreading, often fragrant. Leaves, three to four large, ribbed or veined.

CULTURE: Compost, osmunda or peat fibre, loam fibre and sphagnum moss. Rather deep pans or baskets should be used. *P. elata* should be placed in a pot as the many-flowered spike is erect. Water infrequently when growth first commences, liberally as the growths gain strength. In winter, if atmospheric moisture is correct, few, if any, waterings are required. Avoid syringing until the leaves are free. Drainage must be ample. Shading should be dispensed with in early autumn and exposure then to full light benefits. Winter temp. 60°. Increase the heat as growth appears. In summer, with sun heat, it may reach 80°. All the species are worth growing and usually flower early summer to summer. The plants should be given a position in full light during winter.

PROPAGATION: By division of large plants. When repotting, back bulbs may be taken off, leaving four in front, placed on crocks in a pan and potted if, and when, growth is seen.

SPECIES CULTIVATED: *P. aspersa*, fragrant, yellowish, spotted purplish-red, lip maroon or purplish, Brazil, Venezuela; *cerina*, fragrant, citron-yellow, Cent. America; *elata*, scapes 3 to 6 ft. high, flowers twenty or many more, fragrant, waxy white, lip dotted purple, Panama; *pendula*, fragrant, yellowish, flushed and spotted with purplish-red, usually autumn, Guiana, Brazil. Other species are known but seldom appear in cultivation.

Peristrophe—*Acanthaceae*. Greenhouse flowering plant. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, well-drained pots in sunny greenhouse, June to Oct., ordinary greenhouse conditions at other times. Water moderately Sept. to March, freely at other times. Temp., Sept. to March 50° to 60°, March to Sept. 60° to 65°. Nip off points of young shoots several times during growing season to induce bushy habit. Apply liquid manure when plants are established in final pots.

PROPAGATION: By cuttings inserted in pots of sandy soil placed in warm propagating case in spring.

SPECIES CULTIVATED: *P. speciosa*, rich carmine-purple, winter, 2 ft., Himalaya.

Periwinkle, see *Vinca*.

Pernettya (Prickly Heath)—*Ericaceae*. Hardy evergreen shrubs with brightly coloured berries persisting until spring. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, peaty. Position, moist rockeries or margins of open or shady shrubberies and beds. Plant, Sept. to Nov. or March to May.

POT CULTURE: Compost, two parts peat, one part leaf-mould and sand. Position, cold or cool greenhouse or dwelling room. Pot, Oct. or Nov. Water moderately. When berries shrivel or fall off plant outdoors.

WINDOW BOX CULTURE: Soil, ordinary. Position, sunny or shady. Plant, Sept. to Jan. Remove when berries shrivel.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in bed of peaty soil outdoors in autumn; layering shoots in March or April.

SPECIES CULTIVATED: *P. mucronata*, white, spring, 2 to 5 ft., Magellan Islands, and vars. *atrococcinea*, *alba* and *lilacina*; *pumila*, pink or white berries, small, prostrate, Falkland Is.

Perovskia—Labiatae. Hardy, deciduous, semi-woody shrub with striking, greyish-white shoots and leaves.

CULTURE: Soil, good, well-drained loam. Position, sunny borders or shrubberies, excellent for chalky soils and maritime localities. Plant, Nov. to Feb. in groups of three or four. Cut away dead growth in early spring.

PROPAGATION: By cuttings of nearly ripened growth in July, inserted in sandy soil under bell-glass.

SPECIES CULTIVATED: *P. atriplicifolia*, violet-blue, Aug. to Sept., 3 to 5 ft., Himalaya and Afghanistan.

Persea—Lauraceae. Stove evergreen shrub with edible pear-shaped fruit, purplish when ripe. First introduced early eighteenth century.

CULTURE: Compost, equal parts loam and peat and a little sand. Position, moist stove in pots. Pot in March. Water freely in summer, little in winter. Syringe daily in spring and summer. Temp., March to Sept. 75° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown in above compost in a temp. of 85°; by cuttings in sand under bell-glass in a similar temp. in spring.

SPECIES CULTIVATED: *P. americana* (syn. *P. gratissima*), 'Avocado Pear', 'Alligator Pear', green, summer, to 60 ft., W. Indies.

Persimmon, see *Diospyros virginiana*.

Peruvian Bark Tree, see *Cinchona*; **-Lily**, see *Alstroemeria*; **-Mastic Tree**, see *Schinus Molle*.

Pescatorea—Orchidaceae. An epiphytic genus, sometimes included in *Zygopetalum*. Pseudo-bulbs are absent, habit tufted. Large attractive flowers borne singly, scapes usually shorter than leaves. The lips bear a transverse ribbed crest.

CULTURE: Compost of half osmunda fibre or substitute, and half sphagnum moss with crushed crocks and nodules of charcoal. The pots should have drainage to a quarter of their depth. A moist atmosphere and water must be given throughout the year. Winter temp. 60°, not less; summer, 70° to 75°. In repotting see that all dead roots are cut cleanly away. The majority of species flower in summer.

PROPAGATION: By division of plants when repotting in spring.

SPECIES CULTIVATED: A selection—*P. cerina*, citron-yellow, crest tinted red, Trop. America; *Dayana*, creamy white tipped green, lip white and crimson, crest deep crimson, Colombia; *Klabochorum*, white, passing to brownish-purple, lip whitish with purplish-tipped hairs, crest white and crimson-purple, Colombia, Ecuador.

Petamenes—Iridaceae. Cormous plants, formerly included in *Antholyza*.

CULTURE: Soil, light sandy. Position, sunny well-drained borders or pots in cool greenhouse. Plant in Oct. Lift in Aug., dry and store in a cool place till planting time.

PROPAGATION: By offsets; seeds in slight heat in spring.

SPECIES CULTIVATED: *P. abbreviatus*, yellow and red, April, 2 to 3 ft., Cape Colony.

Petasites—*Compositae*. Hardy perennial herb. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, shrubberies or woodland, partially shaded borders. Plant, Oct.

PROPAGATION: By division, Oct. or Nov.

SPECIES CULTIVATED: *P. fragrans*, 'Winter Heliotrope', pale lilac, fragrant, Feb., 6 in., Medit. region; *japonicus*, violet, Feb., 6 ft., Sachalin, and var. *giganteus*.

Petrea—*Verbenaceae*. Stove-flowering deciduous shrubs and climbers. First introduced early eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand, little charcoal. Position, well-drained pot, bed or border, with shoots of climbing species trained up rafters or trellises in shady part of stove. Pot or plant, Feb. or March. Prune slightly, Feb. Water freely March to Sept., moderately afterwards. Syringe daily March to Sept. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 60°.

PROPAGATION: By cuttings of firm young shoots inserted in sandy soil in well-drained pot under bell-glass in temp. 65° to 75°, spring and summer.

SPECIES CULTIVATED: *P. arborea*, violet-blue, summer, 12 ft., shrub, Colombia; *racemosa*, dark violet, summer, climber to 15 ft., Trop. America; *volubilis*, 'Purple Wreath', purple, summer, climber, to 15 ft., Trop. America, and var. *albiflora*.

Petrophytum—*Rosaceae*. Prostrate evergreen shrubs suitable for rock gardens, sometimes included in *Spiraea*.

CULTURE: As *Spiraea*.

PROPAGATION: As *Spiraea*.

SPECIES CULTIVATED: *P. caespitosum* (syn. *Spiraea caespitosa*), white, summer, 3 in., N.W. America; *Hendersonii* (syn. *Spiraea Hendersonii*), white, mat-forming to 1 in., N.W. America.

Petroselinum—*Umbelliferae*. Biennial herbs with divided or curled leaves and sometimes edible roots.

CULTURE OF PARSLEY: Semi-shaded, ordinary, well-manured soil. Often grown as edgings to borders or in beds. Sow in the open in April and Aug. Seeds may take eight weeks to germinate. Thin seedlings to 9 in. Remove flower stems. Give protection to autumn sowing for winter supply. Summer and autumn pullings keep colour best when dried.

SPECIES CULTIVATED: *P. crispum*, 'Parsley', yellow, summer, 1 to 2 ft., Europe, W. Asia, var. *radicosum*, 'Parsnip-rooted' or 'Hamburg Parsley', edible roots.

Pe-Tsai, see *Brassica pekinensis*.

Petunia—*Solanaceae*. Half-hardy herbaceous perennials. First introduced early nineteenth century.

INDOOR CULTURE: Compost, two parts decayed turfy loam, one part well-rotted manure, quarter part silver sand. Position, sunny greenhouse or window. Shade only from bright sun. Pot, Feb. to June, moderately firmly. Size of pots, 3, 5 and 6 in. Pinch out point of young shoots occasionally in spring to induce bushy growth. Prune shoots of old plants moderately closely in Feb. or March. Water moderately Sept. to April, freely afterwards. No syringing required. Apply stimulants to established plants when flower buds form. Train shoots to stakes. Suitable liquid manures: $\frac{1}{4}$ oz. nitrate of soda or sulphate of ammonia to 1 gallon of water, applied three or four successive times only; $\frac{1}{4}$ oz. guano to a gallon of water, applied twice a week; weak, liquid, natural manure, applied as advised for guano. Temp., March to Oct. 55° to 65°, Oct. to March 40° to 50°.

OUTDOOR CULTURE: Soil, ordinary rich. Position, sunny beds, borders, vases or trellises. Plant, June. Lift, Sept., and store in pots in greenhouse to furnish cuttings in spring. Water freely in dry weather. Place in cold frame in May to harden before planting out. Apply stimulants as above.

PROPAGATION: By seeds sown on surface of a compost of equal parts good soil,

leaf-mould and sand in a well-drained pot or pan, in temp. 65° to 75°, in Feb., March or April; by cuttings of young shoots inserted in light, sandy soil in pots, pans or boxes in temp. 55° to 65° any time in spring.

SPECIES CULTIVATED: *P. axillaris* (syn. *P. nyctaginiflora*), white, Aug., 2 ft., Argentine; *integrifolia*, purple, 18 in., Argentine; *violacea*, purple, summer, 6 to 10 in., Argentine. The garden vars. are hybrids between these species.

Peucedanum, see *Anethum* and *Pastinaca*.

Phacelia—*Hydrophyllaceae*. Hardy annuals. Good bee flowers. First introduced early nineteenth century.

CULTURE: Soil, ordinary rich. Position, sunny or partially shaded beds or borders. Sow seeds in patches or lines where required to grow in April. Thin seedlings to 6 or 8 in. apart in June.

SPECIES CULTIVATED: *P. campanularia*, blue, summer, 8 in., California; *congesta*, blue or lavender, June, 2 to 3 ft., Texas and New Mexico; *Parryi*, violet, summer, 1 ft., California; *tanacetifolia*, blue or lilac, July, 2 to 3 ft., California; *viscida* (syn. *Eutoca viscida*), blue and white, summer, 1½ to 2 ft., S. California; *Whitlavia* (syn. *Whitlavia grandiflora*), 'Californian Bluebell', blue, Sept., 1 ft., California.

Phaedranassa (Queen Lily)—*Amaryllidaceae*. Greenhouse flowering bulbous plants. First introduced early nineteenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould, and half a part sand. Position, well-drained pots near the glass, March to Oct.; in dry place under stage, Oct. to March. Pot, Feb. or March. Water moderately March to May, freely May to Oct., keep nearly dry Oct. to March. Apply stimulants May to Aug. only. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°. Repot annually, removing old soil away from bulbs. Place in small pots first; shift into larger sizes later on. No shade required.

PROPAGATION: By seeds sown ½ in. deep in well-drained pots or pans of sandy soil in temp. of 60° to 65° in spring; offsets removed and treated as old bulbs at potting time.

SPECIES CULTIVATED: *P. Carmiolii*, red and green, summer, 2 ft., Costa Rica; *chloracea*, scarlet and green, summer, 18 in., Ecuador; *Lehmannii*, scarlet, summer, 2 ft., Colombia; *schizantha*, green and red, 18 in., Peru.

Phaenocoma—*Compositae*. Greenhouse evergreen flowering shrub. First introduced late eighteenth century.

CULTURE: Compost, two parts good brown fibrous peat, one part silver sand, and little charcoal. Position, well-drained pots in light part of greenhouse; no shade. Pot, March or April. Firm potting most essential. Prune straggling shoots only moderately in Feb. or March. Water moderately Sept. to April, freely afterwards. No syringing required. Admit air freely in summer. Shoots can be trained round stakes or trellis.

PROPAGATION: By cuttings of firm young shoots inserted in well-drained pots of sandy peat under bell-glass in temp. of 55° to 65°, summer.

SPECIES CULTIVATED: *P. prolifera*, crimson, rose, and purple, May to Sept., 3 to 4 ft., S. Africa, var. *Barnesii*, superior form.

× **Phaio-Calanthé**—*Orchidaceae*. Bigeneric hybrids between *Phaius* and *Calanthé*; none occurs naturally.

CULTURE: Compost, as for *Phaius*. The hybrids between the deciduous *Calanthes* and *Phaius* usually assume a shabby appearance in winter as they are partially deciduous. A rest must then be given but water may occasionally be required. Winter temp. at night about 60°. Hybrids between the evergreen species should not be so strictly rested. Winter temp. 65° at night; both enjoy a higher temp, 70° to 80°, during summer and exposure to light in autumn. Shading should be very light for the first section, heavier for the second, which should have a moist atmosphere throughout the year. The syringe should not be used.

Phaius—*Orchidaceae*. A genus of terrestrial orchids (one species epiphytic). Pseudo-bulbs usually short, stout, clustered. Spikes from their base, often tall. Leaves large, veined. Flowers, generally large, and fairly showy.

CULTURE: Compost for the *P. grandifolius* section, principally fibrous loam, with a little osmunda fibre or peat, and sphagnum moss mixed with finely crushed crocks; 2 to 3 in. of drainage should be placed in the pots. Other than newly potted plants may have occasional applications of weak manure-water when growing, that made from cow manure and soot is preferable. Species from N. India and Burma should have a winter night temp. of 55° to 60°. Water will be required in the winter but not too frequently. Species from tropical countries, Malaya, etc., should have a winter temp. of 65° or slightly higher. Species from Madagascar, 70° and only a small proportion of loam fibre in their compost. Summer temps. for all, with shading, may reach 80°. The syringe should not be used until the foliage, infolded when young, is free, but a moist atmosphere is enjoyed. Several beautiful hybrids have been raised, particularly with *P. tuberosus*.

PROPAGATION: By division of plants. Healthy back bulbs may be removed from some, and, placed in a propagating case, will often emit growths.

SPECIES CULTIVATED: A selection—*P. assamicus*, yellowish, lip white-bordered, spring, summer, Assam; *bicolor*, reddish-brown, lip white, rose, yellow, early summer, Ceylon; *Blumei*, buff yellow or brownish, lip whitish, yellowish and crimson-red, spring, Java; *callosus*, reddish-brown, whitish at tips, lip trumpet-shaped, yellowish-white, shaded pink, purple beneath, spur two-lobed, summer, Malaya, Java; *Cooperi*, near *P. callosus*, red-brown, lip whitish, blotched red-brown in throat, winter, Malaya; *flavus*, soft yellow, lip marked red-brown, much crisped, spring, N. India, Burma, Java; *grandifolius*, yellow-brown or reddish-brown, silvery behind, lip yellow-brown, rose-purple bordered white, variable, spring, India, China, Australia; *Humboldtii*, rose-purple, shaded white, mid-lobe of lip spreading, rose-purple and whitish, summer, Madagascar; *mishmiensis*, stems elongated, spikes lateral, soft rose, lip with a central ridge of white hairs, winter, Mishmi Hills, Assam, Burma; *Roeblingii*, large, lemon-yellow to red-brown, lip yellow, red-streaked at base, then whitish, veined rose, summer, Khasia; *Sanderianus*, near *P. Blumei*, of which it is often termed a var., spikes 7 to 8 ft. high, flowers large, red-bronze, lip yellow, then dusky rose, white-margined, spring, Assam; *simulans*, epiphytic, whitish, lip with rose blotches, keels yellow, near base, circular tuft of yellow hairs, winter, Madagascar; *tuberosus*, white, mid-lobe of lip with three yellow keels, behind them four rows of white hairs, winter, Madagascar; *Wallichii*, near *P. grandifolius*, but stronger, tawny-brown, yellow margined, mid-lobe of lip whitish with a yellow red-lined disk, winter, spring, N. India, var. *Mannii*, larger, more deeply coloured.

Phalaenopsis (Moth Orchids)—*Orchidaceae*. A beautiful epiphytic genus containing some of the most handsome of the *Orchidaceae*. Pseudo-bulbs are absent, stems short, leaves usually rather large and persistent, flatly inclined. A few species have erect, cylindrical leaves. In many the scapes are long and branched, in others simple. The flowers of some species have the front lobe of the lip narrowed and terminating in two long curved 'tendrils'. Variation exists.

CULTURE: Compost, two parts osmunda fibre or substitute, two parts sphagnum moss, a few decayed oak or beech leaves may be added. The roots are extensive and clinging. Pans or baskets are preferable and should be suspended about 18 in. from glass, so tilted that they preferably face the south-west. Drainage must be ample. The roots resent disturbance and the plants should not be disturbed until absolutely necessary. In the spring the old compost may be carefully picked out and new inserted. Later in the summer the operation may again be needed to a lesser degree. In winter the plants are practically dormant but require a moist and consistent atmosphere of 70° or near that. In summer, with shading, the temp. can rise to the tropical and the syringe be freely used, but not too late in the day. Water freely in summer and at no period should the

compost be allowed to become really dry. Air must be carefully admitted, frequently by the bottom vents only, as draughts and loss of atmospheric moisture are detrimental. Shading is required and should be carefully given when young leaves are present. In autumn light should be freely given. Natural hybrids exist and several crosses have been artificially raised.

PROPAGATION: Young plants are sometimes produced on the flower spikes and occasionally on the roots. These, when rooted, can be potted.

SPECIES CULTIVATED: A selection—*P. amabilis*, 'Blume', branched, large, pure white, lip yellow and red spotted at base of side lobes, mid-lobe with two tendrils, autumn, winter, variable, Malaya; *Aphrodite*, branched, pure white, lip with yellow stain and marked purple, tendrils long, spring, various, Philippines; *Boxallii*, scape short, yellow, traversed with red-brown, mid-lobe of lip anchor-shape, spring, Philippines; *Cornu-cervii*, scapes short, flowers in succession, yellow barred with red-brown, lip whitish, mid-lobe crescent-shaped, summer, Malaya; *intermedia* (syn. *P. Lobbi*), scapes branched, white or rose flushed, lip light amethyst-purple, winter, Philippines; *leucorrhoda*, white, flushed with rose-purple, lip white, with some red-purple spots and a yellow stain, summer, winter, natural variable hybrid, Philippines; *Louii*, often deciduous, few, white, flushed purple, mid-lobe of lip deep purple, dwarf growing, summer, Burma; *Lueddemanniana*, whitish, barred with amethyst and cinnamon-brown, mid-lobe of lip amethyst, with a white-haired ridge, variable, various, Philippines; *Mannii*, dwarf, small, yellow, marked with chestnut-brown, lip yellow, mid-lobe anchor-shaped, spring, Assam; *Parishii*, dwarf, small, white, lip rose-purple, sometimes deciduous, summer, Burma; *rosea*, scapes branched, small, many, white, flushed rose-purple, lip rose-purple, variable, various, Philippines; *Sanderiana*, rose-pink to rose-purple, sometimes white-mottled, mid-lobe with two short tendrils, autumn, winter, Philippines; *Schulleriana*, many, light rose-purple, lower sepals dotted purple, mid-lobe of lip with two 'flukes', very variable, winter, various, Philippines; *speciosa*, starry, amethyst-purple, blotched purple, mid-lobe of lip white, and purplish or purple, scapes branching, proliferous, variable, summer, Andamans; *Stuartiana*, many, white, sometimes dotted at bases with purple, lower sepals with their inner halves yellow, thickly spotted rose-purple, lip white, yellowish, purple spotted, mid-lobes, terminating in two white 'flukes', winter, Philippines; *sumatrana*, yellowish, barred red-brown, mid-lobe of lip narrow, whitish, streaked purple, with a tuft of hair near apex of the keel, summer, variable, Sumatra; *tetraspis*, variable, ivory-white, mid-lobe of lip with a dense tuft of bristle-like hairs, summer, Andamans, Malaya; *Veitchiana*, white, flushed purple, lip chiefly crimson-purple, winter, Philippines; *violacea*, few, white, greenish, flushed violet-purple, in places mid-lobe of lip violet-purple, pointed, summer, variable, Sumatra, Malaya.

Phalaris—*Gramineae*. Hardy annual and perennial flowering ornamental grasses. Flowers, white, green, purple, borne in panicles, July. Leaves, green or variegated with white.

CULTURE OF ANNUAL SPECIES: Sow seeds $\frac{1}{2}$ in. deep in April where required to grow. Soil, ordinary. Position, sunny.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny or shady borders. Plant, Oct. to April. Lift, divide, and replant every two or three years.

PROPAGATION: Perennials by seeds sown outdoors in April, transplanting seedlings following Oct.; division of plants, Oct. to April.

ANNUAL SPECIES CULTIVATED: *P. canariensis*, 'Canary Grass', 18 in., S. Europe.

PERENNIAL SPECIES CULTIVATED: *P. arundinacea variegata*, 'Gardener's Garters', 'Lady's Garters', 'Ribbon Grass', 'Silver Grass', leaves striped with silvery white, 3 to 6 ft., N. Regions.

Phaseolus (Bean)—*Leguminosae*. Stove and hardy perennials and annuals, extensively grown for edible seeds and pods. Kidney or French Bean introduced early sixteenth century, Runner Bean mid-seventeenth century.

CULTURE OF SNAIL FLOWER: Compost, equal parts loam and peat, little sand.

Position, well-drained pots, shoots twining round trellises, posts or pillars. Pot, Feb. Water moderately in winter, freely in summer. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown in light soil in temp. 65° in March; cuttings inserted in sandy soil under bell-glass in temp. 65° in April.

CULTURE OF KIDNEY OR FRENCH BEAN: Soil, light, rich, well manured. Position, open, sunny. Draw drills 3 in. deep and 18 in. apart. Sow seeds 6 in. apart end of April, middle of May, beginning of June, and end of July. Protect early sowings with sticks or straw. Thin seedlings when three leaves appear to 12 in. apart, replanting thinnings to form another row or rows. Water the drills thoroughly, if soil be dry, before sowing the seeds. Mulch with manure when seedlings appear. Water freely in dry weather. Apply stimulants when pods form. Plants bear earlier if sown along centre of early celery ridges than if sown in open garden. Pick when young and tender. For haricot vars. pick whole plant when pods turn brown and hang in open shed to dry and ripen thoroughly before thrashing.

FORCING: Sow monthly from end of Sept. to April. Compost, two parts good soil, one part decayed manure. Size of pots, 8 in. Put 1 in. of crocks in bottom, next a layer of half-decayed tree leaves or fresh horse droppings, then enough compost to half-fill the pot. Dibble seeds $\frac{1}{2}$ in. deep, five per pot. Moisten with tepid water. Water moderately when seeds sprout, freely when 1 in. high. Top-dress with equal parts soil and manure when plants reach rim of pot when pinch out growing points. Apply stimulants after top-dressing has been done a fortnight. Temp., 55° to 65°. Support shoots with small twigs. No shade required. Keep close to glass.

CULTURE OF RUNNER BEANS: Soil, light, deep, well manured. Position, sunny or partially shady garden, arbour, trellis, or fences; former best. Sow seeds first week in May, 4 in. apart and 3 in. deep in drills 6 ft. asunder; in double rows 9 in. apart and 8 ft. asunder; in trenches 9 in. wide, 12 in. deep containing 3 in. manure and 6 in. soil, seeds being dibbled 2 in. deep, 4 in. apart in two rows 6 in. asunder. Support plants with long stakes or trellises or strands of twine when 6 in. high, or nip off point of main shoot when 2 ft. high and subsequent shoots when 6 in. long to ensure dwarf habit. Mound up those sown in drills. Mulch with manure. Water freely in dry weather, otherwise flowers will fall off. Apply stimulants freely when pods form. Quantity of seed required for a row 50 ft. long: $\frac{1}{2}$ pint of French beans, 1 pint of runner beans. Seeds retain their vegetative powers for three years and germinate in ten to twelve days. French beans reach maturity fourteen weeks after sowing and runner beans sixteen weeks afterwards.

ORNAMENTAL SPECIES CULTIVATED: *P. Caracalla*, 'Snail Flower', lilac, summer, climbing perennial, Tropics.

CULINARY SPECIES CULTIVATED: *P. coccineus* (syn. *P. multiflorus*), 'Scarlet Runner Bean', var. *albus*, 'Dutch Bean', flowers white, Trop. America; *lunatus*, 'Lima Bean', Guatemala; *vulgaris*, 'Kidney Bean', 'Haricot Bean', 'French Bean', white or violet, var. *humilis*, non-climbing form.

Pheasant's-eye, see *Adonis*.

Phellodendron—*Rutaceae*. Hardy deciduous trees with aromatic, ash-like foliage and small black fruits. First introduced about mid-nineteenth century.

CULTURE: Soil, deep, rich loam. Position, as specimens on lawns and in other open places. Plant, Nov. to Feb.

PROPAGATION: By seed sown in pans in greenhouse or frame during Feb. or March or by cuttings of nearly ripe wood inserted under bell-glass in sandy soil during July.

SPECIES CULTIVATED: *P. amurense*, 20 to 40 ft., China, Japan; *japonicum*, 20 to 35 ft., China and Japan; *sachalinense*, fast growing, 30 to 50 ft., Japan, Korea and China.

Phenomenal Berry, see *Rubus loganobaccus*.

Philadelphus (Mock Orange)—*Saxifragaceae* (or *Hydrangeaceae*). Hardy deciduous flowering shrubs often incorrectly known as *Syringa*. First introduced late sixteenth century.

CULTURE: Soil, ordinary, well drained. Position, equally at home in full sun or partial shade in the border. Stronger kinds make good lawn specimens. Plant, Oct. to Feb. Prune immediately after flowering, thinning out shoots that have bloomed only. Small kinds suitable for pot culture.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould and sand. Repot annually after flowering. Position, cold greenhouse Dec. to May or warm greenhouse Dec. to April, outdoors in sunny spot afterwards, pots plunged to the rim in coal ashes or soil. Water moderately indoors, freely outside.

PROPAGATION: By cuttings of young shoots inserted in sandy soil in close, cold frame outdoors, Aug. or Sept.; hardwood cuttings of stronger growing kinds outdoors in Nov.; removal of rooted suckers.

SPECIES CULTIVATED: *P. californicus*, white, June, 10 ft., fragrant, California; *coronarius*, 'Common Mock Orange', cream, early June, to 10 ft., very fragrant, S.E. Europe; *Coulteri*, 'Rose Syringa', rather tender, purple-blotched petals, June, 6 ft., Mexico; *Delavayi*, violet calyx, very fragrant, 6 to 10 ft., W. China; *grandiflorus*, white, scentless, end June, 10 to 15 ft., S.E. United States; *hirsutus*, white, scentless, early June, 6 to 8 ft., S.E. United States; *Lemoinei*, hybrid, white, June, 5 to 7 ft., parent of many well-known vars.; *mexicanus*, white, tender, very fragrant, slow growing, 3 to 4 ft., June, Colorado and Arizona; *pekinensis*, slightly fragrant, cream, 6 to 8 ft., N. China to Korea, and vars. *brachybotrys*, stronger growing to 10 ft., *kansuensis*, fragrant, 10 ft., June; *pubescens*, scentless, white, 10 ft., June, U.S.A.; *purpurascens*, very fragrant, purple calyx, 8 to 10 ft., June, W. China; *tomentosus*, creamy white, early June, 6 to 8 ft., Himalaya. Named hybrids and vars. are probably more popular than the species and can be found in trade catalogues.

Philesia—*Liliaceae*. Half-hardy evergreen flowering shrub. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts peat, loam and coarse silver sand. Position, against walls or in pots in cold or cool greenhouse; against walls or in sheltered nooks outdoors, S.W. of England or Ireland. Pot or plant, Feb. to April. Water freely March to Oct., moderately afterwards. Syringe foliage daily in greenhouse March to Oct. Prune directly after blooming.

PROPAGATION: By cuttings inserted in sandy peat under bell-glass in greenhouse in summer; suckers in spring.

SPECIES CULTIVATED: *P. magellanica* (syn. *P. buxifolia*), rosy crimson, June, 6 in. to 2 ft., S. Chile.

Phillyrea—*Oleaceae*. Hardy evergreen flowering shrubs. Leaves lance- or egg-shaped, dark green. First introduced late sixteenth century.

CULTURE: Soil, ordinary. Easily cultivated in any situation. Plant, Sept. to April. Prune straggly shoots only in April. With the exception of *P. decora* all kinds may be clipped to formal shapes or to form hedges.

PROPAGATION: By cuttings of firm shoots in sandy soil in frame in Sept.

SPECIES CULTIVATED: *P. angustifolia* 'Jasmine Box,' white, May, 8 to 10 ft., Mediterranean; var. *rosmarinifolia*, rosemary-leaved; *decora* (syn. *P. Vilmoriniana*), white, May, 8 to 10 ft., W. Asia; *latifolia*, white, May, 20 ft., Mediterranean, and varieties. See also *Osmarea*.

Philodendron—*Araceae*. Stove evergreen dwarf or climbing plants, grown in greenhouses as foliage plants. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts peat, leaf-mould, loam and silver sand. Pot or plant, Jan. to April. Position, dwarf kinds in pots; tall ones in beds or borders, with shoots trained up walls or pillars. Water freely all the year round. Syringe daily. Temp., March to Sept. 70° to 80°, Sept. to March 65° to 70°.

PROPAGATION: By cuttings of stems inserted in light soil in temp. 75° at any time.

SPECIES CULTIVATED: *P. Andreanum*, climber, spathe black, purple, and creamy white, Colombia; *calophyllum*, spathe creamy white and crimson, Brazil, Guiana; *gloriosum*, leaves green, white, and pink, climbing, Colombia; *giganteum*, broadly heart-shaped leaves, climbing, W. Indies; *verrucosum* (syn. *P. Lindenii*), dwarf, Colombia. Many other species of little interest.

Phlomis—*Labiatae*. Hardy perennials and evergreen shrubs. First introduced late sixteenth century.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny beds, borders, rockeries or banks. Plant, Oct. to April. Lift, divide and replant every three years.

CULTURE OF SHRUBBY SPECIES: Soil, well-drained, light or chalky loam. Position, sunny borders or rockeries. Good maritime plant, not hardy in cold districts. Plant, Oct. to April.

PROPAGATION: By seeds sown in light soil in warm greenhouse in March or sunny spot outdoors in April; herbaceous kinds also by division, Oct. or March; shrubs by cuttings inserted in cold frame in Aug.

PERENNIAL SPECIES CULTIVATED: *P. cashmeriana*, lilac, July, 2 ft., Himalaya; *Herba-venti*, purple and violet, summer, 12 to 18 in., S. Europe; *samia*, yellow and orange, May to Aug., 2 to 3 ft., N. Africa; *tuberosa*, rose-purple, June, 3 to 5 ft., S. Europe and Asia Minor; *viscosa* (syn. *P. Russelliana*), golden yellow, June, 2 to 3 ft., Syria.

SHRUBBY SPECIES CULTIVATED: *P. fruticosa*, 'Jerusalem Sage', yellow, June, 3 to 4 ft., S. Europe.

Phlox—*Polemoniaceae*. Hardy perennial and half-hardy annual plants. First introduced early eighteenth century.

CULTURE OF ALPINE SPECIES: Soil, deep, rich, sandy loam containing a little leaf-mould or peat. Position, edgings to sunny borders or on ledges of rockeries. Plant, March to May. Lift and divide only when grown too large for their position, in March.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould and half a part sand. Pot, March. Position, cold frame or greenhouse. Water moderately Oct. to April, freely other times. Admit air freely always.

CULTURE OF HERBACEOUS PERENNIALS: Soil, deep, rich, moderately heavy loam, light soils not suitable. Position, sunny or partly shaded borders. Plant, Oct., Feb. or March. Mulch liberally with decayed manure or compost in March or April. Apply liquid manure frequently May to Sept. Water freely in dry weather. Cut down stems in Oct. Lift, divide and replant in fresh rich soil triennially.

CULTURE OF ANNUAL SPECIES: Sow seeds in light soil in temp. 55° to 65° in March. Transplant seedlings 2 in. apart in boxes or pots, gradually harden off and plant outdoors 6 in. apart in rich soil in sunny position, in June. Nip off point of main shoot after planting to induce bushy growth. Water freely in dry weather. Mulch with manure or peat.

POT CULTURE: Compost, two parts loam, one part decayed manure or leaf-mould and little sand. Plant four seedlings in 5 in. pot in April. Keep in temp. 55° until June then place in cold frame or on outside window-sill. Water freely. Apply stimulants when 3 in. high. Nip off points of shoots when 3 in. high. No repotting required.

PROPAGATION: Annuals, by seed. Herbaceous perennials, seeds sown in sandy soil in temp. 55° in autumn or spring; cuttings of shoots from base of old plant in sandy soil in temp. 55° in March; division of plants in Oct. or March; cuttings of roots early in the year as precaution against eelworm disease. Alpine species, by cuttings of shoots in sandy soil in cold frame in July; division in March or April.

ALPINE SPECIES CULTIVATED: *P. adsurgens*, salmon-pink, May to June, 6 in., California, Oregon; *alyssifolia*, pink, spring, 2 to 3 in., N. America; *amoena*, pink, spring, 3 in., N. America; *andicola*, white, spring, 3 to 4 in., N. America;

bryoides, white, spring, 1 in., N. America; *condensata*, white, spring, 1 in., N. America; *divaricata* (syn. *P. canadensis*), blue, May to June, 12 in., N. America; *Douglasii*, lavender to pink, spring, 2 to 3 in., N. America, numerous vars. and hybrids; *Hoodii*, white, May, $\frac{1}{2}$ in., N. America; *nana*, rich soft rose, June, 9 in., one of the loveliest of alpine phlox, N. America; *ovata* (*P. carolina* of gardens), pink or red, summer, 12 to 15 in., N.W. America; *procumbens*, pink, spring, 6 in., hybrid; *stolonifera*, pink or purple, spring, 6 in., N. America; *subulata*, 'Moss Pink', various, early summer, N. America, many vars. and hybrids.

PERENNIAL SPECIES CULTIVATED: *P. Arendsii*, lavender, summer, to 2 ft., hybrid; *glaberrima*, red, May to June, 1 to 2 ft., N. America; *carolina*, purple, rose and white, late summer, to 4 ft., N. America, early blooming vars. are widely cultivated as *P. suffruticosa*; *maculata*, 'Wild Sweet William', purple, July, fragrant, 2 ft., N. America; *paniculata*, purple and white, Aug., fragrant, 3 to 4 ft., U.S.A., horticultural forms often known as *P. decussata*.

ANNUAL SPECIES CULTIVATED: *P. Drummondii*, various, summer, 1 ft., Texas, and many vars.

Phoenix—*Palmae*. Stove feather palms. Dates are the fruits of *P. dactylifera** First introduced late sixteenth century.

CULTURE: Compost, three parts good fibrous loam, one part old cow manure and a little coarse sand. Position, well-drained pots or tubs in sunny part of stove. Pot, Feb. or March. Water moderately Oct. to March, copiously March to Oct. Syringe foliage morning and evening daily April to Sept., morning only Sept. to April. Apply weak stimulants occasionally May to Sept. Place a lump of sulphate of iron on surface of soil occasionally to keep foliage of a rich, healthy green hue. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown 1 in. deep in light, sandy soil under bell-glass or in propagator in temp. 75°, March or April.

SPECIES CULTIVATED: *P. acaulis*, 8 to 12 ft., India; *canariensis*, 30 to 40 ft., Canary Isles; *dactylifera*, 'Date Palm', 80 to 100 ft., N. Africa; *humilis*, 3 to 6 ft., India; *reclinata*, 25 to 35 ft., S. Africa; *Roebelenii*, 4 to 6 ft., S.E. Asia; *rupicola*, 15 to 20 ft., Himalaya; *sylvestris*, 30 to 40 ft., India.

Pholidota—*Orchidaceae*. Epiphytes, allied to *Coelogyne*. The flowers small, many, usually arranged in two rows, each flower based by comparatively large bract often partially concealing the flower. Two sections are represented, in one the rhizome is creeping, usually carrying rounded pseudo-bulbs, often clustered. In the second the jointed stems are erect, with somewhat oblong pseudo-bulbs, the newer proceeding from near the top of the older. Support should be given.

CULTURE: Compost, as for *Coelogyne*s. Winter night temp. about 60°, summer, with shading, 70° or more. Water liberally in summer; in winter the stemmed section requires more frequent watering than the dwarfer-growing hard-bulbed kinds, judgement must be used. A moist atmosphere is beneficial.

PROPAGATION: By dividing plants of the creeping species. By severing the top-most joint or two of the stemmed kinds, and potting in early spring, or by cuttings of two joints placed in a propagating case.

SPECIES CULTIVATED: Stemmed section—*P. articulata* (syn. *P. Khasyana*), yellowish-white, summer, autumn, Burma, India; *Lugardii*, whitish-tinged flesh, summer, Burma; *recurva*, creamy white, inflorescence one-sided, late summer, India, Burma. Creeping Section—*P. chinensis*, whitish to reddish-pink, summer, S. China; *conchoidea*, small, whitish, tinged pink, lip marked with ochre-yellow, summer, Philippines; *imbricata*, 'Rattlesnake Orchid', greenish-yellow, bracts brownish, overlapping, summer, India, Burma, Australia; *pallida*, perhaps a var. of *imbricata*, whitish, smaller; *ventricosa*, strong-growing, inflorescence erect, yellowish-white, summer, Java. Other species are known.

Phormium—*Liliaceae*. Half-hardy perennial herbs. First introduced late eighteenth century.

INDOOR CULTURE: Compost, two parts turfy loam, one part each of leaf-mould

and sand. Position, pots, tubs or beds in cold or warm greenhouse, conservatory, balcony or dwelling-room. Pot, Feb. to April. Water copiously April to Oct., moderately afterwards. May stand outdoors in sunny position June to Sept.

OUTDOOR CULTURE: Soil, light, deep loam. Position, margins of ponds or streams, isolated specimens on lawns, or in beds or borders S. and S.W. of England and Ireland only. In other districts plants must be put out in May, lifted in Oct. and stored in greenhouse until following May. Plant permanently in April or May. Water freely in dry weather. Protect those left outdoors all winter with straw or dried fern.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pots of sandy soil in greenhouse or frame in March; division of roots in April.

SPECIES CULTIVATED: *P. Colensoi* (syn. *P. Cookianum*), yellow and green, summer, 4 to 6 ft., New Zealand; *Hookeri*, green, summer, 5 ft., New Zealand; *tenax*, 'New Zealand Flax', yellow, summer, 5 to 12 ft., New Zealand, and vars. *atropurpureum*, leaves purple, *variegatum*, leaves yellow, green, and white, and *Veitchii*, leaves creamy white.

Photinia—*Rosaceae*. Hardy and slightly tender deciduous and evergreen shrubs or small trees. Handsome foliage and hawthorn-like flowers and fruits. First introduced early nineteenth century.

CULTURE: Soil, light, rich, well drained. Situation, warm and sheltered.

PROPAGATION: By seed sown in March to April in well-drained pots in cold frame.

SPECIES CULTIVATED: *P. Davidsoniae*, evergreen, handsome young foliage, tinted bronze, 20 to 40 ft., fairly hardy, Cent. China; *parvifolia*, deciduous, scarlet berries, 6 to 8 ft., Cent. China; *serrulata*, 'Chinese Hawthorn', evergreen, white April to May, scarlet fruits, copper young foliage, not hardy coldest areas, 30 ft., China; *villosa*, deciduous, handsome, autumn foliage and fruits, 12 to 15 ft., Japan and China.

Phragmipedium—*Orchidaceae*. *Selenipedium* of gardens. Terrestrial or epiphytic orchids without pseudo-bulbs. Scapes, several flowered. There are numerous hybrids.

CULTURE: As for Paphiopedilums, winter night temp. need never exceed 60°. Compost, half peat or osmunda fibre, one part fibrous loam, one part sphagnum.

PROPAGATION: As for Paphiopedilum.

SPECIES CULTIVATED: *P. caricinum*, 3 to 6, small, greenish-white, petals twisted, summer, Bolivia, Peru; *caudatum*, 1 to 4, whitish, creamy white, veined green, lip variable, petals ribbon-like up to 30 in. long, spring, summer, Peru, Ecuador, Cent. America; *Lindenii* (syn. *Uropedium Lindenii*), lip in a ribbon-like form; *Lindleyanum*, 3 to 7, greenish, veined and shaded with red-brown, petals twisted, winter, British Guiana, Demerara; *longifolium*, 6 to 10, green and rose, various seasons, Costa Rica; *Sargentianum*, near *P. Lindleyanum*, greenish-lilac, olive green, red marked, autumn, Pernambuco; *Schlimii*, 3 to 8, small, pretty, white, rose and carmine rose, various seasons, Colombia; *vittatum*, 2 to 7, greenish-white, shaded and spotted with brown-purple, leaves edged yellowish, various seasons, Brazil.

Phygellus—*Scrophulariaceae*. Slightly tender evergreen shrub with handsome penstemon-like flowers. First introduced mid-nineteenth century.

CULTURE: Soil, light, with some humus, well drained. Position, warm, sheltered corners or beneath walls, full sun, open borders extreme south-west. Prune in April, shortening back any growth damaged by frost.

PROPAGATION: By cuttings of half-ripened shoots with bottom heat, July, or seed sown in well-drained pots in cold frame, early spring, germination slow; division of rootstock in early spring.

SPECIES CULTIVATED: *P. capensis*, 'Cape Fuchsia', scarlet, Sept., 2 to 6 ft., S. Africa, var. *coccineus*, brighter, cooler.

Phyllachne—*Stylidiaceae*. Perennial, cushion-forming, alpine plants.

CULTURE: For the skilled cultivator and best grown in the alpine house or cold frame. Very gritty scree soil containing some finely sifted leaf-mould and loam. Wedge between small stones in sun. Do not over-water in winter.

PROPAGATION: By seeds, if obtainable; small rosettes rooted as cuttings in early summer.

SPECIES CULTIVATED: *P. Colensoi*, white, summer, $\frac{1}{2}$ in., New Zealand; *clavigera*, white, summer, $\frac{1}{2}$ in., New Zealand.

Phyllagathis—*Melastomaceae*. Stove flowering sub-shrub.

CULTURE: Compost, equal parts peat and sand with a little leaf-mould. Position, well-drained pots in heated greenhouse. Water abundantly during growing season, moderately at other times. Moist atmosphere essential during summer months. Temp., March to Sept. 75° to 85°, Sept. to March 65° to 70°.

PROPAGATION: By leaf cuttings inserted in sandy compost in temp. 85° and brisk bottom heat.

SPECIES CULTIVATED: *P. rotundifolia*, pink flowers surrounded by deep purple bracts, July, leaves large, glossy green tinged metallic blue and purple, red beneath, 1 to 2 ft., Sumatra.

Phyllanthus—*Euphorbiaceae*. Stove ornamental-foliaged plants. First introduced late seventeenth century.

CULTURE: Compost, equal parts sandy loam and fibrous peat, one part equal proportions of charcoal, dried cow manure, powdered brick and coarse silver sand. Position, well-drained pots in shady part of stove. Pot, Feb. or March. Water moderately Oct. to March, freely afterwards. Syringe morning and evening, April to Sept. Prune into shape, Jan. Temp., Sept. to March 60° to 65°, March to Sept. 70° to 80°.

PROPAGATION: By cuttings of firm shoots, 2 to 3 in. long, inserted singly in small pots of sandy soil under propagator or bell-glass in temp. 75°, spring or summer.

SPECIES CULTIVATED: *P. acidus* (syn. *P. distichus*), 'Otaheite Gooseberry', yellow, 15 to 20 ft., Trop. Asia; *Emblica* (syn. *P. mimosaeifolius*), yellow, mimosa-like foliage, 20 to 30 ft., Trop. Asia; *pulcher* (syn. *Reidia glaucescens*), yellow, summer, leaves green, 3 to 4 ft., Malaya, a pretty table plant; *reticulatus*, red, Aug., 3 to 4 ft., Tropics; *speciosus*, white, Sept., 15 to 20 ft., Jamaica.

Phyllitis—*Polypodiaceae*. Hardy evergreen ferns. Fronds, strap-shaped, crested or contorted.

OUTDOOR CULTURE: Soil, one part each fibrous peat and loam, and one part of sand, broken oyster shells and limestone or mortar rubbish. Position, shady borders, rockeries, chinks of old stone or brick walls, or banks. Plant, April. Water copiously in dry weather.

INDOOR CULTURE: Compost, as above. Position, pots in cold frame, greenhouse or dwelling-room. Shade from sun essential. Pot, Feb. or March. Water freely March to Oct., moderately afterwards.

PROPAGATION: By spores sown on surface of fine peat in well-drained pans placed in temp. 75° any time; division of plants, March or April.

SPECIES CULTIVATED: *P. Scolopendrium* (syn. *Scolopendrium vulgare*), 'Hart's-tongue Fern', 6 to 18 in., Europe (Br.), etc., and numerous crisped, cristate and divided forms.

Phyllodoce—*Ericaceae*. Dwarf hardy evergreen shrubs.

CULTURE: Soil, sandy peat. Position, cool, well-watered spots in the rock garden. Plant, Sept. to Oct. and April to May.

PROPAGATION: By seeds, cuttings of nearly ripened shoots in July and Aug., or by layers in spring.

SPECIES CULTIVATED: *P. Breweri*, purplish-rose, May, 6 to 12 in., California; *caerulea*, bluish-purple, June to July, 6 to 9 in., Europe, Asia and N. America; *empetriformis*, reddish-purple, April, 6 to 9 in., Western N. America; *nipponica*, white and pink, May, 4 to 8 in., Japan, and var. *tsugaefolia*, white flushed pink, 6 in.

Phyllostachys—*Gramineae*. Half-hardy grasses with ornamental foliage, Natives of China and Japan. Inflorescence borne in panicles in summer. Leaves, narrow, lance-shaped, green. Sometimes included in *Bambusa*.

CULTURE: Soil, rich, deep, sandy loam. Position, moist, sheltered borders in south and west only. Protect in winter with dry fern fronds. Plant, March or April.

PROPAGATION: By division of plants in March or April.

SPECIES CULTIVATED: *P. aureus* (syn. *Bambusa aureus*), stems yellow, leaves green, 10 to 15 ft., Japan; *bambusoides* (syn. *P. Quiloi*), leaves bright green, 10 to 18 ft., China; *flexuosa*, leaves dark green, 6 to 8 ft., China; *niger* (syn. *P. puberula*), leaves dark green, stems yellowish-green, 12 to 14 ft., China, var. *Henonis*; (syn. *P. puberula*), leaves dark green, stems yellowish green, 12 to 14 ft.; *sulphurea*, leaves green, 12 to 20 ft., China, Japan; *viridi-glaucescens*, leaves green, stems yellowish, 14 to 18 ft., China.

× **Phyllothamnus**—*Ericaceae*. Small evergreen shrub. Bigeneric hybrid between *Phyllodoce* and *Rhodothamnus*.

CULTURE: Lime-free, peaty or leaf-mould soil. North aspect or cool position.

PROPAGATION: By cuttings of half-ripened wood in late summer.

SPECIES CULTIVATED: *P. erectus*, deep rose, 12 to 15 in., spring.

Physalis—*Solanaceae*. Greenhouse and hardy perennial herbs. Fruit of Cape Gooseberry edible—a berry enclosed in an inflated calyx.

CULTURE OF HARDY SPECIES: Soil, rich. Position, sunny well-drained border. Plant, March or April. Lift, divide and replant in fresh soil every third year. Gather stems bearing fruits in Sept. and dry for winter decorations.

CULTURE OF GREENHOUSE SPECIES: Soil, two parts loam, one part well-decayed manure or leaf-mould, and little sand. Position, singly in 5 or 6 in. pots, with shoots trained to sticks and placed close to front of sunny greenhouse, or planted in small beds and shoots trained up back wall. Pot or plant, Feb. or March. Water freely April to Sept., moderately afterwards. Apply weak stimulants once or twice a week May to Sept. Gather fruit when ripe and fully coloured.

PROPAGATION: Hardy species by seeds sown in sunny spot outdoors in April; division of roots in March or April. Greenhouse species by seeds sown $\frac{1}{16}$ in. deep in shallow pots or pans of light soil and placed in temp. 65° to 75°, Feb. or March; cuttings inserted singly in pots of light, sandy soil placed in propagator or under bell-glass in temp. 65° to 75°, Jan. to April.

HARDY SPECIES CULTIVATED: *P. Alkekengi* (syns. *P. Bunyardii*, *P. Franchettii*), 'Bladder Herb' or 'Winter Cherry', white, summer, fruit scarlet, 1 to 2 ft., S.E. Europe to Japan.

GREENHOUSE SPECIES CULTIVATED: *P. peruviana* (syn. *P. edulis*), 'Cape Gooseberry', white, summer, fruit edible, 3 ft., Tropics.

Physaria—*Cruciferae*. Tufted herbaceous plants.

CULTURE: Gritty scree soil and a sunny pocket in the rock garden.

PROPAGATION: By seeds sown in early spring in gritty, sandy compost.

SPECIES CULTIVATED: *P. didymocarpa*, 'Double Bladder Pod', ornamental, bladder-like seed pods, summer, 2 to 3 in., N. America.

Physosiphon—*Orchidaceae*. An epiphytic genus allied to *Pleurothallis*, habit similar. Flowers small, numerous, the sepals form a tube with tips free, petals and lip concealed in the tube.

CULTURE: Compost, temp., etc., as for *Masdevallia* but water is not required as frequently in winter, the leaves usually being harder in texture.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: *P. guatemalensis*, yellow and purple-red, spring to summer, Guatemala; *Lindleyi*, green and reddish, spring, Mexico; *Loddigesii*, height about 6 in., scapes longer, greenish and orange-brown, spring to summer, Mexico, Guatemala.

Physostegia (False Dragonhead)—*Labiatae*. Hardy herbaceous perennials. First introduced late seventeenth century.

CULTURE: Soil, light ordinary. Position, cool, partially shaded borders. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light, sandy soil outdoors in April; cuttings of young shoots inserted in light, sandy soil under hand-light or in cold frame, April or May; division of roots, Oct. or March; root cuttings in winter.

SPECIES CULTIVATED: *P. virginiana* (syn. *Dracocephalum virginianum*), rosy pink, June to Sept., 1 to 4 ft., N. America, and numerous vars.

Phyteuma (Horned Rampion)—*Campanulaceae*. Hardy perennial herbs.

CULTURE: Soil, deep, rich loam mixed with limestone grit and old mortar and leaf-mould or peat. Position, sunny rockeries for dwarf species, sunny borders for tall. Plant, March or April. Lift, divide and replant only when overgrown. Top-dress dwarf species with a mixture of peat, leaf-mould, lime, and a little old mortar annually in Feb. or March. Water freely in dry weather.

PROPAGATION: By seeds sown in light, sandy soil in shallow boxes in cold frame, Sept. or Oct., transplanting seedlings in permanent positions, April or May; division of plants in March or April.

SPECIES CULTIVATED: *P. comosum*, amethyst blue, July, 3 to 4 in., S. Europe; *Halleri*, violet, May to July, 6 to 12 in., Europe; *hemisphaericum*, blue, June to July, 3 to 4 in., Alps; *nigrum*, blue, summer, 18 in., Europe (Br.); *orbiculare*, blue, July, 6 to 12 in., Cent. Europe; *pinnatum* (syn. *Petromarula pinnata*), 'Rock Lettuce', blue, 12 to 15 in., summer, Crete; *Scheuchzeri*, blue, summer, 1 ft., Europe; *serratum*, blue, summer, 2 to 3 in., Corsica; *Sieberi*, blue, summer, 6 to 8 in., Europe; *spicatum*, cream, summer, 3 to 4 ft., Europe; *tenerum*, blue, July, 6 to 12 in., W. Europe (Br.).

Phytolacca (Pokeberry)—*Phytolaccaceae*. Hardy herbaceous perennials. Flowers succeeded by deep purple berries in autumn. Broad, ovate, dark green leaves, changing to rich purple in autumn. First introduced mid-eighteenth century.

CULTURE: Soil, good ordinary. Position, sunny or shady borders in woodlands, banks or ferneries. Plant, Oct., March or April.

PROPAGATION: By seed sown $\frac{1}{2}$ in. deep in sandy soil outdoors in spring or autumn; division of plants in Oct. or March.

SPECIES CULTIVATED: *P. acinosa*, 'Indian Poke', white, summer, 5 ft., Himalaya; *americana* (syn. *P. decandra*), 'Virginian Poke', 'Red-ink Plant', 'Pigeon Berry', white, summer, 5 ft., N. America.

Picea (Spruce)—*Pinaceae*. Hardy evergreen coniferous trees. Leaves needle-shaped, spirally arranged. Branches always produced in tiers to form pyramidal shape. Cones almost always pendulous. *Picea Abies*, the Common or Norway Spruce is the Christmas tree and also produces timber known as white deal. First introduced, probably sixteenth century.

CULTURE: Deep, rich, moist soil, preferring areas of heavy rainfall. Mostly timber trees but some species make handsome specimens up to 100 ft. or more and others are dwarf, suitable for rock gardens. Norway spruce is used as a shelter nurse to larch and other forest trees. Plant, Oct. to April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in sandy loam in cold frame in March, or in prepared beds outdoors in April, $\frac{1}{4}$ lb. seed sufficient to sow 100 sq. ft.; special forms grafted in March.

SPECIES CULTIVATED: *P. Abies* (syn. *P. excelsa*), 'Common Spruce', 100 to 120 ft., N. Europe, and vars. *argentea*, leaves variegated white, *Clanbrasiliana*, dense, slow growing, *columnaris*, fastigiate habit, *Ellwangeriana*, broadly pyramidal, dwarf form, *Gregoryana*, very dwarf, conical to 2 ft., *pendula*, weeping, *virgata*, 'Snake Fir', and numerous others; *asperata*, vigorous, grey-leaved, 50 to 70 ft., China; *bicolor* (syn. *P. Alcockiana*), 80 ft., Japan; *Breweriana*, eventual weeping habit, 80 to 100 ft., California; *Engelmannii*, fine hardy tree, blue-green, 100 to 150 ft., Western N. America; *glauca* (syn. *P. alba*), 'White Spruce', 60 to 100 ft., N.E. America, and vars. *albertiana*, pyramidal to 150 ft., *aurea*, leaves tinged

yellow, *caerulea*, glaucous form, and many dwarf forms including *conica*, *nana* and *compacta*; *jezoensis*, 'Yeddo Spruce', not so hardy as var. *hondoensis*, 80 to 100 ft., Japan; *Koyamai*, narrowly pyramidal, 50 ft., Japan, Korea; *likiangensis*, 60 to 80 ft., W. China, with var. *Balfouriana*, violet-coloured cones; *mariana* (syn. *P. nigra*), 'Black Spruce', 25 to 50 ft., young cones purple, N. America; *obovata*, 'Siberian Spruce', 80 to 100 ft., Siberia, N.E. Russia; *Omorika*, 'Serbian Spruce', easily grown, narrowly conical, leaves white beneath, to 100 ft., Serbia and Bosnia, var. *pendula*, attractive weeping form; *orientalis*, 'Oriental Spruce', one of the best species, good habit, short dark green leaves, 100 ft., Caucasus, with vars. *aurea*, bronze coloured, and *aureo-spicata*, young growth bright yellow; *polita*, 'Tigertail Spruce', stout prickly leaves, to 100 ft., Japan; *pungens*, 'Colorado Spruce', not so common as its beautiful forms *Kosteriana* (syn. var. *glauca pendula*), 'Weeping Blue Spruce', *glauca*, bluish, *Speckii*, bluish, etc., 50 to 100 ft., Colorado to N. Mexico; *rubens* (syn. *P. rubra*), 'Red Spruce', 70 to 80 ft., N. America; *Schrenkiana*, to 100 ft., Cent. Asia; *sitchensis*, 'Sitka Spruce', useful timber tree for moist places, to 150 ft., Alaska to California; *Smithiana* (syn. *P. Morinda*), 'West Himalayan Spruce', 100 to 200 ft., Himalaya; *spinulosa*, 'East Himalayan Spruce', pendulous branches, over 200 ft., Himalaya; *Wilsonii* (syn. *R. Watsoniana*), dense habit, to 70 ft., Cent. China.

Pickrel-weed, see *Pontederia cordata*.

Picotee, see *Dianthus Caryophyllus* var.

Pieris—*Ericaceae*. Hardy evergreen shrubs of great beauty with lily-of-the-valley-like flowers. Some of the species were previously included in *Andromeda*. First introduced early eighteenth century.

OUTDOOR CULTURE: Soil, lime-free loam such as suits rhododendrons but preferably light and moist. Position, partial shade with some shelter from the east. Plant, Sept. to Nov., or March. Prune straggling shoots only moderately after flowering. Water freely in dry positions during summer.

POT CULTURE: Soil, equal parts peat, leaf-mould and fine silver sand. Position, well-drained pots in cold greenhouse, Nov. to June; in shady position outdoors, June to Nov. Pot, Oct. to Nov. Water moderately Nov. to March, freely afterwards.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in sandy peat in cold frame Nov. or March; layering shoots in Sept.

SPECIES CULTIVATED: *P. floribunda*, white, spring, 4 to 6 ft., Virginia; *formosa*, white, spring, 8 to 12 ft., Himalaya; *Forrestii*, young growths red, flowers white, April, 6 ft., China; *japonica*, white, spring, 9 to 10 ft., Japan, and var. *variegata*; *nana* (syn. *Arclerica nana*), white, summer, 3 in., Japan; *taiwanensis*, excellent newer species, attractive young red shoots, flowers when small, white, March to April, 4 to 6 ft., Formosa.

Pigeon Berry, see *Phylolacca americana*; **-Orchid**, see *Dendrobium crumentalum*.

Pignut, see *Carya glabra*.

Pilea—*Urticaceae*. Stove perennial herbs. Flowers, insignificant; unexpanded buds burst when in contact with moisture and discharge pollen. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and silver sand. Position, small pots in partially shaded part of stove. Pot, Feb. to April. Water freely April to Sept., moderately afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 70° to 80°.

PROPAGATION: By seeds sown on surface of light, sandy soil slightly covered with fine soil and placed in temp. 65° to 75° in spring; cuttings inserted singly in small well-drained pots of sandy soil in temp. 65° to 75°, Jan. to May; division of plants, Feb. or March.

SPECIES CULTIVATED: *P. microphylla*, 'Artillery Plant', 3 to 15 in. Trop. America; *nummulariifolia*, prostrate, W. Indies; *Spruceana*, 3 to 12 in., Peru.

Pimelea (Rice-flower)—*Thymelaeaceae*. Greenhouse evergreen flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, three parts fibrous peat, one part turfy loam, half a part silver sand. Position, well-drained pots in light, airy greenhouse. Prune moderately closely immediately after flowering. Pot soon as new growth commences. Firm potting essential. Nip off points of shoots of young plants occasionally to induce bushy growth. Water freely April to Oct., moderately afterwards. Grow in a moist atmosphere for a few weeks after potting, then gradually harden off and place in an airy greenhouse. Temp., Sept. to March 40° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light, sandy soil under bell-glass in temp. 55° to 65°, Feb. to May; cuttings of young shoots, 2 in. long, inserted in compost of one part peat, two parts silver sand, under bell-glass, in temp. 55° to 65°, March or April.

SPECIES CULTIVATED: *P. ferruginea* (syn. *P. decussata*), rose, May, 2 ft., Australia; *gnidia*, red, May, 1 to 5 ft., New Zealand; *ligustrina* (syn. *P. hypericina*), white, May, 5 to 6 ft., Australia; *rosea*, pink, June, 1 to 2 ft., Australia; *spectabilis*, white and pink, May, 4 ft., Australia.

Pimenta—*Myrtaceae*. Aromatic stove evergreen flowering trees. *P. officinalis* furnishes the allspice of commerce. The oil of *P. acris* is used in the preparation of bay rum. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and one part sand. Position, well-drained pots or beds with branches trained to wall. Pot, Feb. or March. Water moderately Oct. to April, freely afterwards. Syringe April to Aug. Prune straggling shoots moderately in March. Temp., Sept. to March 60° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil under bell-glass in temp. 65° to 75° in summer.

SPECIES CULTIVATED: *P. acris*, 'Pimento', white and pink, May, 20 to 30 ft., W. Indies; *officinalis*, 'Allspice', white, summer, 20 to 40 ft., W. Indies.

Pimento, see *Pimenta officinalis*.

Pimpernel, see *Anagallis*.

Pimpinella—*Umbelliferae*. Hardy annual herb. Seeds used as a condiment.

CULTURE: Soil, well drained, ordinary. Position, warm beds or borders. Sow seeds thinly in April where plants are to remain.

SPECIES CULTIVATED: *P. Anisum*, 'Anise', to 2 ft., Greece to Egypt.

Pinanga—*Palmae*. Stove, bamboo-like feather palms. First introduced mid-nineteenth century.

CULTURE: Compost, one part loam, two parts peat, half a part silver sand. Position, well-drained pots in shady, lofty stove. Pot, Feb. or March. Water copiously March to Oct., moderately afterwards. Syringe twice daily March to Sept., once daily afterwards. Place few crystals of sulphate of iron on surface of soil occasionally to ensure deep green foliage. Temp., March to Oct. 75° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep singly in 2 in. pots of sandy loam and peat under bell-glass in temp. 75° to 85° in spring.

SPECIES CULTIVATED: *P. disticha*, 6 ft., Malaya; *malayana*, 8 to 12 ft., Malaya.

Pincushion Flower, see *Scabiosa*.

Pine, see *Pinus*; **-Barren Beauty**, see *Pyxidanthera barbulata*; **-weed**, see *Hypericum gentianoides*.

Pineapple, see *Ananas comosus*; **-Flower**, see *Eucomis comosa*.

Pinella—*Araceae*. Hardy herbaceous perennial.

CULTURE: Soil, light, well drained. Position, sunny.

PROPAGATION: By tubers on lower part of leaf-stalk.

SPECIES CULTIVATED: *P. ternata* (syn. *P. tuberifera*), spathe and spadix green, summer, 1 ft., China, Japan.

Pinguicula (Butterwort)—*Lentibulariaceae*. Greenhouse and hardy perennial insectivorous herbs.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts fibrous peat, sphagnum moss, and clean crocks. Position, well-drained pots or shallow pans placed on inverted pots in saucer of water under bell-glass or hand-light in shade. Pot, March or April. Water freely April to Sept., moderately afterwards. Admit air for a few minutes daily every morning by tilting bell-glass or hand-light. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

CULTURE OF HARDY SPECIES: Soil, rich loam for *P. grandiflora*; peat and rough gravel for *P. alpina*; moist peat or peaty loam for *P. vulgaris*. Plant, March or April. Water freely in dry positions in summer. Mulch with thick layer of leaf-mould in May.

PROPAGATION: By seeds sown on surface of shallow pans filled with equal parts of sphagnum moss, peat and sand, placed under bell-glass, and kept moist in temp. of 55° to 65°, Feb., March or April; division of plants at potting or planting time.

GREENHOUSE SPECIES CULTIVATED: *P. caudata*, carmine, autumn, 6 in., Mexico.

HARDY SPECIES CULTIVATED: *P. alpina*, white and yellow, May, 4 in., Europe (Br.); *grandiflora*, blue and violet, summer, 4 in., Europe (Br.); *vulgaris*, 'Bog Violet', 'Butterwort', violet, summer, 4 to 6 in., Britain.

Pink, see *Dianthus*; **-root**, see *Spigelia marilandica*.

Pinus (Pine)—*Pinaceae*. Hardy evergreen coniferous trees. Leaves needle-like, two to five in a whorl. Cones conical and erect.

CULTURE: Soil, preferably open and well drained. Position, *P. nigra*, *P. Mugo* and *P. Pinaster* suitable for seaside gardens and ordinary soil, *P. nigra* is a good town tree. *P. nigra*, *P. Cembra*, *P. Griffithii*, *P. Pinaster*, *P. Strobus* and *P. sylvestris* suitable for gravelly or sandy soils. *P. nigra* is a good shelter tree and *P. sylvestris*, will grow in the poorest soil and on rocky slopes. *P. sylvestris*, the Scots Pine, often erroneously called Scotch Fir, is famous for production of timber known as deal; it is the most widely distributed of pines. For a quick screen plant Austrian Pine and Lombardy Poplar alternately at 8 ft. apart and grub out the poplars when pines are reasonably established. Pines should be planted in their permanent quarters as early in life as possible. Plant, Sept. to Nov.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pots filled with sandy loam, placed in cold greenhouse or frame in April and seedlings transplanted outdoors the following spring; or $\frac{1}{4}$ in. deep outdoors in April in bed of moist, sandy soil, transplanting seedlings the next year; special vars. grafted on common species in April.

USEFUL FACTS: Average age, 150 years. Timber reaches maturity at 80 years. Weight per cubic ft., 30 lbs. Timber, close-grained and resinous, used in young state for pit-props, staves, etc.; when matured for deal flooring, etc. Seeds ripe in Nov.; 1 lb. seed will yield about 8,000 plants.

SPECIES CULTIVATED: *P. Armandii*, blue-green, 50 to 60 ft., W. China; *Aya-cahuite*, 60 to 100 ft., Mexico; *Balfouriana*, 20 to 50 ft., California; *Banksiana*, 'Canadian Jack Pine', 25 to 50 ft., Eastern N. America; *Bungeana*, 'Lace Bark Pine', 70 ft., N. China; *Cembra*, 'Stone Pine', 60 to 100 ft., Cent. Europe; *cembroides*, 'Nut Pine', slow-growing, round tree with edible seeds, 20 ft., Mexico, and var. *edulis*, taller-growing; *contorta*, 'Beach Pine' or 'Shore Pine', twisted leaves and branches, 30 ft., West N. America; *Coulteri*, 50 to 70 ft., California; *densiflora*, 100 to 120 ft., Japan; *flexilis*, 'Limber Pine', 40 to 80 ft., N.W. America; *Griffithii* (syns. *P. nepalensis*, *P. excelsa*), 100 to 150 ft., Himalaya; *halepensis*, 50 ft., Medit. Region; *koraiensis*, 'Korean Pine', glaucous blue, slow growing, 50 to 100 ft., Korea, Japan; *Lambertiana*, 'Sugar Pine', 70 to 200 ft., N.W. America; *monticola*, 'Mountain White Pine', 100 to 125 ft., West N. America.

Mugo (syn. *P. montana*), 'Mountain Pine', varying in height from 5 to 60 ft., with var. *Mughus*, almost prostrate, Cent. Europe; *muricata*, 'Bishop's Pine', 50 to 90 ft., California; *nigra* (syn. *P. Laricio*), 'Austrian Pine', 70 to 100 ft., W. Asia; *parviflora*, 30 to 40 ft., Japan, and var. *pentaphylla*, the wild form; *Peuce*, 'Macedonian Pine', Macedonia; *Pinaster*, 'Cluster Pine', 100 to 120 ft., Medit. Region; *Pinea*, 'Italian Stone Pine', edible seeds, 40 to 100 ft., Medit. Region; *ponderosa*, 'Western Yellow Pine', 100 to 150 ft., N.W. America; *radiata* (syn. *P. insignis*), 'Monterey Pine', 100 to 120 ft., California; *resinosa*, 'Red Pine', 50 to 100 ft., East N. America; *rigida*, 'Northern Pitch Pine', 50 to 80 ft., Eastern N. America; *Sabiniana*, 'Digger Pine', 40 to 80 ft., California; *Strobus*, 'White Pine', 60 to 100 ft., N.E. America; *sylvestris*, 'Scots Pine', to 100 ft., Europe, including Britain, and vars. *argentea*, 'Silver Scots Pine', *pendula*, weeping, and *Watereri*, *pumila*, *globosa*, dwarf forms for rockeries; *Thunbergii*, 'Japanese Black Pine', 80 to 100 ft., Japan; *virginiana*, 'Scrub Pine', for poor dry soil, 30 to 50 ft., Eastern N. America.

Pinxter Flower, see *Rhododendron nudiflorum*.

Piper (Pepper Plant)—*Piperaceae*. Stove and greenhouse evergreen shrubs with marbled or blotched leaves. The pepper of commerce is obtained from the dried berries of *P. nigrum*. First introduced mid-eighteenth century.

CULTURE OF STOVE SPECIES: Compost, two parts loam, one part leaf-mould, half a part sand. Position, well-drained pots in shade. Pot, Feb. to April. Prune slightly into shape, Feb. Water freely April to Oct., moderately afterwards. Syringe twice daily April to Sept., once daily afterwards. Temp., March to Oct. 75° to 85°, Oct. to March 55° to 65°.

CULTURE OF GREENHOUSE SPECIES: Compost, as for stove species. Position, well-drained pots in partial shade. Pot, March or April. Water moderately Oct. to April, freely afterwards. Temp., March to Oct. 55° to 65°, Oct. to March 50° to 55°.

PROPAGATION: By cuttings of half-ripened shoots inserted in small pots of sandy soil under bell-glass in temp. of 65° to 75°, March to July.

STOVE SPECIES CULTIVATED: *P. Bette*, green, climber, India; *nigrum*, 'Pepper', green, 4 to 6 ft., India.

GREENHOUSE SPECIES CULTIVATED: *P. excelsum aureo-pictum*, leaves green and creamy white, 4 to 6 ft., Australia; *Futokadsura*, 'Japanese Pepper', greenish, 4 to 6 ft., Japan.

Pipe Vine, see *Aristolochia durior*.

Piptanthus—*Leguminosae*. Slightly tender evergreen flowering shrub, loses its leaves during winter in colder districts. First introduced early nineteenth century.

CULTURE: Soil, rich, sandy loam. Position, warm, sheltered shrubberies S. and S.W. of England; against south walls N. of London. Plant, Sept., Oct., April or May. Prune straggling shoots moderately after flowering.

PROPAGATION: By seeds sown in sandy soil in cool greenhouse or cold frame in spring; cuttings of ripened shoots inserted in small pots of sandy soil under bell-glass or hand-light outdoors, Aug. or Sept.; layering shoots, Sept. or Oct.

SPECIES CULTIVATED: *P. laburnifolius* (syn. *P. nepalensis*), 'Nepal Laburnum', yellow, May, 8 to 12 ft., Himalaya.

Piqueria—*Compositae*. Greenhouse flowering perennial. First introduced late eighteenth century.

CULTURE: Compost, loam, leaf-mould and sand. Position, pots in greenhouse or bedded out during the summer months. Pot, March or April. Plant in open May or June. Lift and repot in early Oct.

PROPAGATION: By cuttings in spring in gentle bottom heat; by division at potting time; by seeds sown in temp. 60° in Feb.

SPECIES CULTIVATED: *P. trinervia*, white, various seasons, 1 to 1½ ft., Mexico, etc., and var. *variegata*, leaves marked with white. This plant is frequently listed in catalogues as *Stevia serrata*.

Pistachio Nut, see *Pistacia vera*.

Pistacia (Pistachio-nut)—*Anacardiaceae*. Hardy evergreen and deciduous trees. No beauty of flowers which are without petals, but handsome foliage with brilliant autumn tints. First introduced mid-seventeenth century.

CULTURE: Soil, deep, well drained, ordinary. Position, sheltered shrubberies S. and S.W. England; against south walls N. of London. Plant evergreen species, Sept., Oct., April or May; deciduous species, Nov. to Feb.

PROPAGATION: By cuttings inserted in sandy soil in cold frame or under hand-light, Sept. or Oct.; layering in Sept. or sowing of imported seeds in cold frame in March.

SPECIES CULTIVATED: *P. atlantica*, 'Mt. Atlas Mastic', slightly tender, deciduous, 40 ft., N. Africa; *chinensis*, 'Chinese Pistachio', deciduous, handsome pinnate leaves, best species, hardy, to 75 ft., China; *Lentiscus*, 'Mastic', tender, evergreen, 15 to 20 ft., Medit.; *Terebinthus*, 'Chian Turpentine', deciduous, 15 to 30 ft., Asia Minor and Medit.; *vera*, 'Pistachio', tender, requiring warm wall, but not producing nuts in this country, 20 ft., Levant.

Pistia (Tropical Duck Weed)—*Araceae*. Stove floating aquatic perennial. Flowers, borne on spadix at base of wedge-shaped, notched, pale green, hairy leaves. First introduced early nineteenth century.

CULTURE: Plant in shallow tub or tank in stove. Place 2 in. layer of soil on bottom of tub or tank and plant on surface of water. Replenish with tepid water occasionally. Add fresh soil annually. Temp., March to Oct. 70° to 85°, Oct. to March 60° to 70°. A humid atmosphere is necessary.

PROPAGATION: By offsets.

SPECIES CULTIVATED: *P. stratiotes*, 'Water Lettuce', yellowish-green', 1 to 12 in., Jamaica.

Pisum (Pea)—*Leguminosae*. Hardy annual vegetables with edible seeds or pods.

CULTURE OF GARDEN PEAS: Soil, deeply cultivated and well manured. Position, open, sunny. Sow in sheltered site towards end of Feb. and follow at intervals of three weeks until June. There are dwarf and tall as well as early and late varieties. Draw out flat drills 6 to 8 in. wide, 2½ in. deep and height of var. apart. Draw earth up to plants when 6 in. high and provide twiggy stakes. Mulch to width of 15 in. on each side of row with manure or apply balanced fertiliser when in full flower. Water copiously in dry weather. For very early pods sow under glass in 4½ in. pots in Jan., harden off in cold frame and plant outside in late Feb. or protect Jan. or Sept. sown rows with cloches. Round seeded peas are hardier than the sweeter marrowfat varieties. Quantity of seed required for a row 50 ft. long, 1 pint. Seeds retain their vegetative powers for 3 to 4 years and seeds germinate in 10 to 20 days. Crop reaches maturity in 18 to 24 weeks. Protect seeds from mice and birds by damping them with paraffin and then rolling in red lead.

CULTURE OF SUGAR PEAS: Soil, as for garden peas. Sow in March or April, 2½ in. deep in drills 6 in. wide and 6 ft. apart, and earth up and stake in the usual way. Gather pods when fully developed and cook like French beans.

SPECIES CULTIVATED: *P. sativum*, 'Garden Pea', white, summer, Europe, Asia, vars. *arvense*, 'Field Pea', pinkish, summer, climber, *humile*, 'Early Dwarf Pea', low form with small pods, *macrocarpon*, 'Edible Podded Pea', soft pods to 6 in.

Pitcairnia—*Bromeliaceae*. Stove perennial herbs. Leaves, narrow or sword-shaped; margins prickly. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts fibrous loam, rough peat and leaf-mould. Pot, March. Water freely always. Good drainage essential. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By offshoots, inserted in small pots at any time.

SPECIES CULTIVATED: *P. albiflos*, white, Sept 1½ to 2 ft., Brazil; *alta*, red, Aug., 2 to 3 ft., W. Indies; *Andreana*, yellow and red, summer, 1 ft., Venezuela and Colombia; *angustifolia*, red, Sept., 2 to 3 ft., W. Indies; *aphelandrae-*

flora, red, summer, 1 ft., Brazil; *beycalema* (syn. *P. muscosa*), red, winter, 1 ft., Brazil; *staminea*, red, Jan., 1 to 2 ft., Brazil; *violacea*, violet, summer, 1 ft., Brazil. There are forty or more other species of botanical interest.

Pitcher-plant, see *Sarracenia* and *Nepenthes*.

Pittosporum (Parchment-bark)—*Pittosporiaceae*. Slightly tender flowering shrubs. Some species very fragrant but all flowers inconspicuous. Attractive foliage grown commercially for florists. First introduced late eighteenth century.

CULTURE IN GREENHOUSE: Compost, two parts fibrous loam, one part fibrous peat, half a part silver sand. Position, pots or tubs in light, airy, sunny greenhouse. Pot, March or April. Prune straggling shoots moderately immediately after flowering. Water moderately Sept. to April, freely afterwards. Syringe occasionally, except when in flower, during summer. Temp., Oct. to April 40° to 50°, April to Oct. 60° to 70°.

CULTURE OUTDOORS: Soil, ordinary, well drained, including chalk. Position, in the open in warmest maritime localities of the south; inland, requiring shelter of wall. Plant, April.

PROPAGATION: By cuttings of moderately firm shoots, 2 to 3 in. long, inserted singly in small pots of sandy soil under bell-glass in shade in temp. 55° to 65° in summer.

HALF-HARDY SPECIES CULTIVATED: *P. crassifolium*, 'Parchment-bark', purple, spring, 15 to 20 ft., New Zealand; *eugenioides*, greenish-yellow, 20 to 30 ft., New Zealand; *Ralphii*, dark purple, spring, 15 ft., New Zealand; *tenuifolium*, the hardiest species, bright green leaves, wavy margins, black stems, chocolate-purple, May, fragrant, 20 to 30 ft., New Zealand; *Tobira*, white, fragrant, summer, 10 to 20 ft., Japan and China; *undulatum*, 'Victorian Box', creamy white, May to July, 30 to 40 ft., Australia; *viridiflorum*, greenish-yellow, June, to 25 ft., S. Africa.

Pityrogramma (Gold and Silver Ferns)—*Polypodiaceae*. Stove ferns, sometimes known as *Ceropteris* and *Gymnogramma*. Bipinnate, tufted fronds, interesting for the white or bright yellow powder on the under surface. First introduced late eighteenth century.

CULTURE: Compost, one part fibrous peat, one part leaf-mould and loam, one part silver sand, charcoal and coarsely ground bones. Position, erect species in well-drained pots, drooping species in baskets. Pot, Feb. or March. Water moderately Oct. to Feb., freely afterwards. Syringing or shading not necessary. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By spores sown on surface of fine sandy peat under bell-glass in temp. 75° to 85° any time; division of plants at potting time; fronds with plantlets pegged on to surface of sandy peat under bell-glass in temp. 70° to 80° at any time.

SPECIES CULTIVATED: *P. calomelanos* (syn. *Gymnogramma calomelanos*), 'Silver Fern', fronds to 3 ft. long and 10 in. wide, powdery white beneath, Trop. America and Africa, var. *aureo-flava* (syns. *Gymnogramma chrysophyllum*, *P. chrysophylla*), 'Gold Fern', gold-coloured powder; *sulphurea* (syn. *Gymnogramma sulphurea*), 'Jamaica Gold Fern', fronds to 1 ft. and 5 in. wide, sulphur-yellow powder, W. Indies; *tartarea* (syn. *Gymnogramma tartarea*), fronds to 2½ ft. and 1 ft. wide, white powdery beneath, Trop. America; *triangularis* (syn. *Gymnogramma triangularis*), 'Californian Gold Fern', fronds to 7 in. long and 6 in. wide, golden-yellow powder beneath, or sometimes white, California to Alaska.

Placea—*Amaryllidaceae*. Greenhouse bulbs. First introduced early nineteenth century.

CULTURE: Compost, two parts sandy loam, one part well-decayed cow manure or leaf-mould, and one part coarse sand. Plant in borders in greenhouse during Aug. or Sept., placing point of bulb just below surface of soil. These plants do not thrive well when confined to pots. Repot annually in Aug. Season of growth,

Jan. to Aug.; season of rest, Aug. to Jan. Temp., Dec. to April 50° to 55°, April to Aug. 60° to 70°, Aug. to Dec. 35° to 40°.

PROPAGATION: By offsets in Aug.

SPECIES CULTIVATED: *P. Arzæ*, yellow and purple, summer, 1 ft., Chile; *grandiflora*, white and crimson, summer, 1 ft., Chile; *ornata*, white and red, 1 ft., Chile.

Plagianthus—*Malvaceae*. Slightly tender deciduous flowering trees and shrubs. Some species formerly classified as *Plagianthus* have now been transferred to *Hoheria*. First introduced mid-nineteenth century.

CULTURE: Soil, sandy loam and leaf-mould. Position, sheltered border or against a south wall in southern counties only. Plant, Nov. to Feb.

PROPAGATION: By cuttings in sandy soil in a cold frame in autumn; layers in spring.

SPECIES CULTIVATED: *P. betulinus*, yellowish-white, dioecious, summer, 30 to 40 ft., deciduous, New Zealand; *divaricatus*, yellowish-white, May, 8 ft., New Zealand. For the plant often known as *P. Lyallii*, see *Hoheria glabrata*

Plagiorrhagma, see *Jeffersonia*.

Plane Tree, see *Platanus*; **London-**, see *Platanus acerifolia*; **Scotch-**, see *Acer Pseudoplatanus*.

Plantain, see *Musa paradisiaca*; **-Lily**, see *Hosta*.

Platanus (Plane-tree)—*Platanaceae*. Hardy deciduous trees with ornamental foliage and ball-like clusters of fruits hanging throughout winter, and characteristic peeling bark of trunks and branches. First introduced mid-sixteenth century.

CULTURE: Soil, deep, rich, moist loam. Position, parks, avenues, etc., for Oriental Plane; streets, squares in towns, or in open gardens or shrubberies in country for London Plane. Plant, Oct. to March. Prune into shape when desirable, Oct. to Feb. Plenty of moisture at roots essential; dry soil not suitable.

PROPAGATION: By seeds simply pressed into surface of soil in moist position outdoors in autumn; cuttings of shoots, 6 to 8 in. long, inserted in moist soil in sheltered position in Nov.

SPECIES CULTIVATED: *P. acerifolia*, 'London Plane', 70 to 100 ft., habitat uncertain, probably a hybrid between following two species, with vars. *pyramidalis*, pyramidal habit, and *Suttneri*, leaves blotched creamy white; *occidentalis*, 'Buttonwood' or 'American Plane', seldom grown in England, to 150 ft., South U.S.A.; *orientalis*, 'Oriental Plane', 80 ft. to 100 ft., S.E. Europe, Asia Minor.

Platynerium—*Polypodiaceae*. Stove and greenhouse evergreen ferns. Fronds, more or less broad, divided, resembling a stag's horn. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous peat and sphagnum moss. Position, blocks of wood suspended from roof or sides of greenhouse or stove. Place plant on block of wood, cover roots with layer of moss and peat and secure in position by means of copper wire. Top-dress annually with fresh peat and moss in Feb. or March. Water copiously April to Sept., moderately afterwards. Shade from sun. Temp. for stove species, Oct. to March 55° to 65°, March to Oct. 70° to 80°; greenhouse species, Oct. to March 45° to 55°, March to Oct. 60° to 70°.

PROPAGATION: By offsets in Feb. or March; also by spores sown in sandy peat in temp. 75° to 85°.

STOVE SPECIES CULTIVATED: *P. grande*, nearly glabrous, fronds stag-like to 6 ft., Australia; *Hilli*, deep green, fertile fronds erect to 1½ ft., Queensland; *Stemaria* (syn. *P. aethiopicum*), fertile fronds, white tomentose beneath, W. Trop. Africa; *Wallichii*, similar to *P. grande* but yellowish tomentose, Malaya; *Willinckii*, Java.

GREENHOUSE SPECIES CULTIVATED: *P. bifurcatum* (syn. *P. alcorni*), 'Stag's horn Fern', Australia, and var. *majus*, larger, greener, more leathery.

Platycodon (Balloon Flower)—*Campanulaceae*. Hardy herbaceous perennial. First introduced late eighteenth century.

CULTURE: Soil, ordinary rich. Position, sunny, well-drained borders or rockeries. Plant, Oct., Feb. or March.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in sandy soil in temp. 55°, March or Aug.; cuttings, 3 in. long, of young shoots inserted singly in small pots of light, sandy soil in temp. 55° in March or April; division of plants in April.

SPECIES CULTIVATED: *P. grandiflorum*, 'Chinese Bell-flower', blue, July to Sept., 1 ft., China and Japan, and vars. *album*, white, *Mariesii*, dwarf white.

Platylobium (Flat Pea)—*Leguminosae*. Greenhouse flowering evergreen shrub. First introduced early nineteenth century.

CULTURE: Compost, three parts peat, one part loam, and little silver sand. Position, well-drained pots in light, airy greenhouse. Pot, Feb. or March. Nip off points of young shoots in spring to induce bushy growth. Water freely April to Sept., moderately Sept. to April. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°. Stand plants outdoors from July to Sept. to mature flowering shoots for following year.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of sandy peat in temp. of 55° to 65° in March or April; cuttings inserted in sandy soil under bell-glass in temp. 55°, April to July.

SPECIES CULTIVATED: *P. obtusangulum*, yellow and red, May, 1 ft., Australia; *triangulare*, yellow, May, 1 ft., Australia.

Platystemon—*Papaveraceae*. Hardy annual. First introduced early nineteenth century.

CULTURE: Soil, good ordinary. Position, sunny beds, borders or rockeries. Sow seed $\frac{1}{8}$ in. deep in patches where required to grow, in April. Thin seedlings 1 to 2 in. apart when $\frac{1}{4}$ in. high. Water freely in dry weather. Mulch with decayed manure or coconut-fibre refuse in June.

SPECIES CULTIVATED: *P. californicus*, 'Cream Cups', yellow, July, 1 ft., California.

Plectranthus—*Labiatae*. Greenhouse perennial herbs and sub-shrubs allied to *Coleus*. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould and sand. Position, pots in sunny greenhouse or frame. Pot, March to June. Water freely in summer, moderately at other times. Feed with liquid manure or an approved fertiliser when plants are established in final pots. Temp., March to Oct. 55° to 65°, October to March 45° to 55°.

PROPAGATION: By cuttings of side shoots inserted in sandy soil in propagating frame in temp. 55° to 60° during March or April.

SPECIES CULTIVATED: *P. chiradzulensis*, blue, to 3 ft., winter, Trop. Africa; *fruticosus*, blue, summer, 3 to 4 ft., S. Africa; *Mahonii*, purple, winter, 2 ft., Trop. Africa; *Oertendahlii*, whitish-lavender, Oct. to Nov., 6 in., creeping herb popular in Scandinavia as a window plant, prob. Trop. Africa; *purpuratus*, blue, winter, 18 in., Natal.

Pleioblastus—*Gramineae*. Shrubs with tufted or creeping rootstocks, formerly included in *Bambusa* and *Arundinaria*.

CULTURE: Soil, good, not too heavy and of reasonable depth. Position, must be sheltered from cold winds, and dry root conditions are disliked.

PROPAGATION: By division in April and May.

SPECIES CULTIVATED: *P. gramineus* (syn. *Arundinaria Hindsii*), hardy, quick-spreading, 8 ft., Japan; *humilis*, 2 to 5 ft., Japan; *pumilus*, 2 ft., Japan; *Simonii*, quick-growing, 15 ft., Japan.

Pleiocarpa—*Apocynaceae*. Stove flowering shrubs. Flowers fragrant, borne on old wood.

CULTURE: Compost, two parts fibrous loam, one part fibrous peat, one part leaf-mould and silver sand. Position, shady part of stove in summer, light position in winter. Pot, March or April; good drainage essential. Water freely March to Sept., moderately at other times. Syringe twice daily April to Sept. Temp., March to Sept. 75° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By no means easy, but cuttings of firm young side shoots 3 in. long, root slowly in pots of sandy peat under bell-glass in temp. 75° to 85° during spring or late summer.

SPECIES CULTIVATED: *P. mutica*, white, winter, 5 ft., Trop. Africa.

Pleione (Indian Crocus)—*Orchidaceae*. A genus, epiphytic or partially so, and terrestrial. Allied to and at one time included in *Coelogyne*. Pseudo-bulbs small, rounded, often warted, some flask-shaped, enduring into the second year, but then dwindling as the growths, generally two from each bulb, gain vigour. Leaves deciduous. Flowers large, brightly coloured, in many produced before the leaves gain size, on very short stems.

CULTURE: Compost, two parts osmunda or peat fibre, two parts fibrous loam, two parts sphagnum moss with a little leaf-mould, sand and small charcoal. Repotting is necessary every year, before flowering, or shortly afterwards. Well-drained pans should be used. Several bulbs may be placed at intervals. Bases of the bulbs must not be buried. They may have to be supported in position for a time. Winter night temp. about 50°. Water may not be required throughout the winter. After repotting water infrequently till growths advance, then more often; less frequently as leaves mature. The syringe should not be used. Suspend pans near the glass, shade lightly, summer temp. may reach 75° to 80° by sun heat. Air may be admitted by night as well as day, avoid draughts.

PROPAGATION: Vigorous pseudo-bulbs emit two growths which after forming pseudo-bulbs again throw two growths.

SPECIES CULTIVATED: A selection—*P. Hookeriana*, whitish or rose-flushed, lip blotched brown-purple and yellow, crested, early summer, Sikkim; *humilis*, pale lilac, lip purple lined, veins fringed, margin white haired, small bulbils often produced on apex of parent bulbs, winter, N. India; *lagenaria*, lilac, lip purple-striped, the front blotched crimson-purple, disk yellow with five fringed ridges, variable, winter, early spring, Burma, Assam; *maculata*, white, lip streaked and blotched crimson-purple with five fringed thin keels, late autumn, N. India, Assam, var. *Arthuriana*, petals lined purple; *praecox*, rose-purple, lip paler, with five-toothed keels, margin fringed, winter, N. India, Burma, var. *alba*, white, lip with sulphur-yellow; *Pricei*, rose or lilac, lip whitish, winter, Formosa; *Reichenbachiana*, rose-lilac, lip whitish, with some purple spots, margin haired, disk with fringed keels, winter, Burma.

Pleiospilos (Living Stones)—*Aizoaceae*. Greenhouse succulent plants.

CULTURE: Compost, six parts sharp sand, 2 parts loam. Position, well-drained pots in sunny greenhouse or window, or bed on greenhouse staging. Plant or pot, August. Water freely, Aug. to Dec.; keep quite dry, Jan. to July. Temp., 60° or over at all times.

PROPAGATION: By seeds or cuttings; as Lithops.

SPECIES CULTIVATED: *P. Bolusii* (syn. *Mesembryanthemum Bolusii*), yellow, Sept. to Oct., S.W. Africa; *Hilmari*, yellow, Sept. to Oct., S.W. Africa; *magnipunctata* (syn. *M. magnipunctatum*), yellow, Sept. to Oct., S.W. Africa; *Purpusii*, yellow, Sept. to Oct., S.W. Africa; *simulans* (syn. *M. simulans*), yellow or orange, Sept. to Oct., S.W. Africa.

Pleomele, see *Dracaena*.

Pleurisy-root, see *Asclepias tuberosa*.

Pleurothallis—*Orchidaceae*. A large epiphytic genus about 500 species (a few terrestrial), widely distributed, Brazil to the W. Indies. Pseudo-bulbs are absent. Leaves solitary, persistent, carried on short or fairly long, slender stems. Flowers from junction of stem and leaf, one, few, clustered or many in a simple raceme, usually small. Habit tufted or creeping. The majority of value only for their freedom of flowering. Considerable variation exists.

CULTURE: Compost and temps. as for *Masdevallias*. A few may require a higher winter temp. but 50° at night is sufficient for most. Winter waterings are required but consideration must be given to the leaf texture; throughout the

summer months water liberally. Light shading is necessary, with that and moisture. Summer temp. may, or may not, be higher than that advised for Odonoglossums and Masdevallias. Small pans or pots are usually suitable but some of the creeping species succeed well on small rafts obliquely inclined, covered with compost, their base fixed in a pot.

PROPAGATION: By division of plants when repotting in early spring. Young plants are in some produced from the base of the old inflorescence, and they may be potted if wanted.

SPECIES CULTIVATED: A selection—*P. astriophora*, very small, blackish-brown, whitish, crimson-purple, pretty, summer; *Birchenallii*, segments attenuated, reddish, greenish, mid-lobe of lip red-haired, spring, Colombia; *cardium*, leaves heart-shaped on slender stems, flowers, one or two, apparently resting on their surface, reddish-copper, lip red, summer, Venezuela; *crinita*, small, greenish, reddish-purple, lip whitish, purple spotted, leaves spotted purple-brown, small, rounded, creeping, raft, winter, Brazil; *grandis*, flowers up to fifty, greenish with a brownish-red suffusion, various, Costa Rica; *immersa*, base of flower spike concealed in two folds of the leaf, greenish-brown with darker stripes, lip dark red, spring, Colombia; *ornata*, small, red to purple-brown, sepal edged with white air-moved filaments, spring, Colombia; *Roezlii*, 15 in. high, scapes as long, flowers comparatively large, deep blackish-purple, lip whitely tomentose, showy, spring, Colombia; *scapha*, segments attenuated, yellowish-white, purple, lined brownish-purple, winter, Venezuela; *stenopetala*, spikes erect, yellowish or greenish-white, attractive, segments tapered, autumn, Brazil.

Plum, see *Prunus*.

Plumbago (Leadwort)—*Plumbaginaceae*. Stove and greenhouse evergreen flowering shrubs. For hardy species, see *Ceratostigma*. First introduced mid-eighteenth century.

CULTURE OF STOVE SPECIES: Compost, equal parts fibrous peat and leaf-mould, half a part each loam and sand. Position, pots, shoots trained to stakes or balloon trellis; or in borders, shoots trained to wall in light part of stove. Pot, Feb. to April. Prune shoots moderately in Jan. Water freely April to Oct., moderately afterwards. Syringe daily March to Sept. Shade from sun. Temp., March to Oct. 75° to 85°, Oct. to March 55° to 65°.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts fibrous loam, half a part of silver sand. Position, pots, shoots trained to stakes or trellis; borders, with shoots trained up rafters, pillars, or walls in light part of house. Pot or plant, Feb. or March. Prune shoots to within 1 in. of base immediately after flowering; flowers borne on points of shoots of current year's growth. Water copiously March to Sept. moderately Sept. to Nov., very little afterwards. Syringe daily until flowering begins. Apply weak stimulants twice a week during flowering period. Shade only from very bright sun. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

PROPAGATION: By seeds sown on surface of sandy peat and slightly covered with fine sandy soil in temp. 65° to 75° in Feb. or March; cuttings of side shoots, 2 to 3 in. long, inserted singly in 2 in. pots of sandy peat in temp. 60° to 70°, Feb. to Aug.

STOVE SPECIES CULTIVATED: *P. indica* (syn. *P. rosea*), purplish-red, winter, 2 ft., India, and var. *coccinea*, larger scarlet flowers; *zeylanica*, white, June, 1½ ft., Tropics.

GREENHOUSE SPECIES CULTIVATED: *P. capensis*, 'Cape Leadwort', blue, summer, 10 to 15 ft., S. Africa, var. *alba*, white.

Plume Poppy, see *Macleaya cordata*; -**Thistle**, see *Cirsium*.

Plumeria (Frangipani Plant)—*Apocynaceae*. Stove deciduous flowering shrubs. First introduced late seventeenth century.

CULTURE: Compost, two parts sandy loam, one part fibrous peat, half a part silver sand. Position, well-drained pots in light stove. Pot, Feb. to April. Prune

straggling shoots moderately close immediately after flowering. Water freely March to Oct., moderately afterwards. Syringe daily March and until flowers appear. Temp., March to Sept. 70° to 80°, Sept. to March 65° to 75°.

PROPAGATION: By cuttings of ripe shoots, 2 to 3 in. long, inserted in small pots filled with sand under bell-glass in temp. 65° to 75° in Feb.

SPECIES CULTIVATED: *P. bicolor*, white and yellow, July, 10 to 15 ft., S. America; *rubra*, 'Frangipani Plant', red, July, 10 to 15 ft., Trop. America, var. *acutifolia*, white and yellow, fragrant.

Podocarpus—*Taxaceae* (or *Podocarpaceae*). Hardy and slightly tender evergreen trees related to Yew. First introduced mid-nineteenth century.

CULTURE: Soil, good deep loam, well drained. Position, sunny, sheltered lawns or shrubberies. Tender species only suitable for southern gardens or sheltered districts. Plant, Oct. to Nov. or March to April.

PROPAGATION: By cuttings of firm young shoots in small pots of sandy loam under bell-glass in temp. 60° to 70° in summer.

SPECIES CULTIVATED: *P. alpinus*, hardy, 3 to 4 ft., Tasmania; *andinus* (syn. *Prumnopitys elegans*), 'Plum Fir', 'Chilean Yew', 40 to 50 ft., Chile; *dacrydioides*, 'Kahika', to 40 ft., New Zealand; *macrophyllus*, hardy, yellowish leaves, 15 to 25 ft., China, Japan; *nivalis*, 'Alpine Totara', hardy, 3 ft., New Zealand; *nubigena*, 20 to 30 ft., Chile; *salignus* (syn. *P. chilinus*), hardy, 15 to 30 ft., Chile; *spicata*, bronze foliage, 60 to 75 ft., New Zealand.

Podolepis—*Compositae*. Hardy annuals. First introduced early nineteenth century.

OUTDOOR CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny, well-drained beds or borders or rock gardens. Sow seeds $\frac{1}{16}$ in. deep in well-drained pots of light soil in temp. of 50° in March, transplanting seedlings outdoors in flowering position, end of May; or sow outdoors in sunny position end of April where required to grow and flower, thinning seedlings to 6 to 8 in. apart when $\frac{1}{2}$ in. high.

SPECIES CULTIVATED: *P. acuminata*, yellow, summer, 1 ft., Australia; *aristata*, yellow and pink, summer, 1 ft., Australia.

Podophyllum—*Berberidaceae*. Hardy herbaceous perennials with large, shield-shaped, divided, ornamental foliage. First introduced mid-seventeenth century.

CULTURE: Soil, moist peat. Position, partially shaded borders, woods, marshes or bog gardens. Plant, March or April.

PROPAGATION: By division of roots in March or April.

SPECIES CULTIVATED: *P. emodi*, 'Himalayan May Apple', white, May, 1 ft., coral-red fruits, Himalaya; *peltatum*, 'Duck's Foot', 'May Apple', white, May, 12 to 15 in., yellow fruits, N. America.

Poellnitzia—*Liliaceae*. Greenhouse succulent-leaved plant, native of S. Africa.

CULTURE: As Haworthia.

PROPAGATION: As Haworthia.

SPECIES CULTIVATED: *P. rubriflora* (syn. *Apicra rubrifolia*), flowers red or orange.

Poet's Laurel, see *Laurus nobilis*; -**Narcissus**, see *Narcissus poeticus*.

Pogonia—*Orchidaceae*. A terrestrial genus. Species are seldom seen in cultivation.

CULTURE: Compost, three parts fibrous loam, two parts peat or osmunda fibre, one part sphagnum moss and a little sand. Drainage should be ample. Pots should be used; a rather decided rest is required in winter in a temp. of 55° for the species given here. Summer temp. 70° or more with shading.

PROPAGATION: Can seldom be effected, possibly only by division.

SPECIES CULTIVATED: *P. speciosa* (syn. *Cleistis speciosa*), 4 ft. high, large, few, purple-rose, lip purple-crimson at apex, keels yellow, summer, Brazil.

Poinciana—*Leguminosae* (or *Caesalpiniaceae*). Tender trees or shrubs with bipinnate leaves and showy flowers in racemes or panicles, native to warm regions.

CULTURE: As *Caesalpinia*.

PROPAGATION: As *Caesalpinia*.

SPECIES CULTIVATED: *P. pulcherrima* (syn. *Caesalpinia pulcherrima*), 'Barbados Pride', 'Barbados Flower Fence', orange or yellow with red stamens, pods 4 in. long, more or less prickly glabrous shrub to 10 ft., Tropics, var. *flava*, yellow. See also *Delonix*.

Poinsettia, see *Euphorbia pulcherrima*.

Poison Ivy, see *Rhus radicans*; **-Sumach**, see *Rhus vernix*.

Pokeberry, see *Phytolacca*.

Polemonium—*Polemoniaceae*. Hardy herbaceous perennials.

CULTURE: Soil, good ordinary or deep, rich, well-drained loam. Position, open, sunny borders for *P. caeruleum* and vars.; sunny, well-drained rockeries for other species. Plant, Oct., March or April. Cut off flower stems immediately after flowering. Top-dress annually in spring with well-decayed manure or leaf-mould.

PROPAGATION: *P. caeruleum* by division of plants in Oct.; other species by division in March or April.

SPECIES CULTIVATED: *P. caeruleum*, 'Jacob's Ladder' or 'Greek Valerian', blue, June, 2 ft., Europe (Br.), var. *album*, white; *carneum*, cream to rose, summer, 12 to 18 in., N.W. America; *confertum*, blue, summer, 6 to 8 in., N.W. America; *flavum*, yellow, summer, 3 ft., New Mexico; *Jacobae* (syn. *P. Richardsonii* hort.), lilac, white or violet-blue, May to Aug., 1 to 1½ ft., hybrid; *reptans*, blue, spring, 6 in., N. America.

Polianthes—*Amaryllidaceae*. Half-hardy, tuberous-rooted plant with fragrant flowers. First introduced early seventeenth century.

CULTURE: Compost, two parts fibrous loam, one part of equal proportions of leaf-mould, decayed manure and coarse silver sand. Pot, African kinds, Oct. to Dec., to flower following autumn; American or Pearl vars. Jan. to April, to flower following winter and spring. Plant bulbs about two-thirds of their depth singly in a 5 in. pot, or three in a 6 in. size. Pot firmly. After treatment: (a) Plunge pots to their rims in bottom heat, 75° to 85°, and give one application of water only until growth begins, then remove to a shelf near the glass in temp. 55° to 65°, and remove to temp. 50° to 55° when in bloom. (b) Place pots on bed of coal ashes in cold frame, cover with 4 in. peat and give no water until growth begins. After this remove the covering, water moderately, and transfer most forward plants to the greenhouse. (c) Pot bulbs in April, plunge pots just above rim in a sunny spot in garden, keep moderately moist, lift pots in Sept. or Oct., and place in greenhouse to flower. Water freely when in full growth. Syringe foliage frequently. Apply stimulants (½ oz. guano or Clay's fertiliser) once a week when growing freely.

OUTDOOR CULTURE: Soil, ordinary rich. Position, warm, sunny border. Plant tubers 3 in. deep and 6 in. apart, March to April, to flower in Aug. and Sept. Plant fresh stock annually.

PROPAGATION: By offsets.

SPECIES CULTIVATED: *P. tuberosa*, 'Tuberose', white, fragrant, autumn and winter, 3 ft., Mexico, and var. *flore-pleno*, double.

Polyanthus, see *Primula Polyantha*.

Polybotrya—*Polypodiaceae*. Stove and greenhouse evergreen ferns, formerly included in *Acrostichum*.

CULTURE: As *Acrostichum*.

PROPAGATION: As *Acrostichum*.

STOVE SPECIES CULTIVATED: *P. apiifolium*, 2 to 6 in., Philippines; *appendiculatum*, 6 to 18 in., India; *cervinum*, 2 to 4 ft., Trop. America; *osmundaceum*, 2 to 3 ft., Ecuador.

GREENHOUSE SPECIES CULTIVATED: *P. canaliculatum*, climbing, Venezuela; *Caenopteris*, climbing, Mexico.

Polygala (Milkwort)—*Polygalaceae*. Hardy herbaceous perennials, greenhouse and hardy evergreen flowering shrubs. First introduced mid-seventeenth century.

CULTURE OF HARDY SPECIES: Soil, sandy peat. Position, sunny border or rockery. Plant, Oct., Nov. or April. No pruning required.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts fibrous peat, one part silver sand. Position, well-drained pots in cool, airy greenhouse. Pot, Feb. or March. Prune straggly shoots only into shape, Feb. Water freely April to Sept., moderately afterwards. No stimulants required. Shade unnecessary. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: Hardy species by cuttings inserted in sandy peat under hand-light or in cold frame in autumn, or by suckers removed in Sept.; greenhouse species by cuttings of young shoots inserted in small pots of sandy peat under bell-glass in temp. 55° to 65° in spring.

GREENHOUSE SPECIES CULTIVATED: *P. Dalmaisiana*, purplish-red, flowers continuously, 4 to 6 ft., hybrid, will grow in the open against a south wall; *myrtifolia grandiflora*, purple, spring, 4 to 6 ft., S. Africa.

HARDY SPECIES CULTIVATED: *P. calcarea*, blue, May, 2 in., Europe; *Chamaebuxus*, 'Bastard Box', yellow, summer, 6 to 9 in., Alps, and var. *grandiflora*, crimson and yellow; *microphylla*, blue, summer, 4 to 6 in., S. Europe; *paucifolia*, pink, summer, 4 in., N. America; *Vayrediae*, pink, summer, 4 to 6 in., Spain.

Polygonatum (Solomon's Seal)—*Liliaceae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary light. Position, partially shaded beds, borders or woodlands. Plant, Oct., Feb. or March. Top-dress annually with decayed manure in March. Apply stimulants occasionally in summer.

POT CULTURE OF *P. MULTIFLORUM*: Pot roots in ordinary light soil in 6 or 8 in. pots in Nov. Cover with peat outdoors or in frame until growth begins, then remove to heated or cold greenhouse to flower. Water freely.

PROPAGATION: By division of roots in Oct. or March.

SPECIES CULTIVATED: *P. biflorum*, green and white, May, 1 to 3 ft., N. America; *Hookeri*, pink, Himalaya; *latifolium*, white, July, 2 to 3 ft., Europe; *multiflorum*, 'David's Harp', white, June, 3 ft., Europe; *odoratum* (syn. *P. officinale*), 'Common Solomon's Seal', white, May, 1 ft., Europe (Br.).

Polygonum (Knotweed)—*Polygonaceae*. Hardy annuals, herbaceous perennials and shrubby climbers.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny, well-drained borders.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. The strong growing *P. cuspidatum* spreads quickly and is difficult to eradicate but is useful for wild gardens. *P. affine* and *P. vacciniifolium* are useful for rockery. Other species for borders. Plant, Oct. to Nov. or March to April.

CULTURE OF SHRUBBY SPECIES: Soil, ordinary. Position, sunny. Useful, for its quick and vigorous twining growth, to cover trellises, arbours or dead tree stumps.

PROPAGATION: Annuals by seed; perennials by seed or division; shrubby species by Aug. cuttings in sandy soil in shaded frame.

ANNUAL SPECIES CULTIVATED: *P. orientale*, rosy purple, Aug. 4 to 6 ft., Tropics, var. *variegata*, variegated form.

PERENNIAL SPECIES CULTIVATED: *P. affine* (syn. *P. Brunonis*), pink, Aug. to Oct., rich colouring of foliage in autumn and winter, 1 ft., Himalaya; *amplexicaule*, rose-red, autumn, 3 ft., Himalaya; *Bistorta*, pink, May to Aug., 2 ft., Europe; *cuspidatum*, white, summer, 5 to 8 ft., very spreading, Japan; *sachalinense*, white, summer, 10 ft., Island of Sakhalin; *sphaerostachyum*, crimson, July to Aug., 1 ft., Himalaya; *vacciniifolium*, rose-red, summer, trailing, half-shrubby species for moist position, Himalaya; *viviparum*, white or rose pink, May to June, 6 in., Arctic Regions.

SHRUBBY SPECIES CULTIVATED: *P. Aubertii*, white sometimes pink, Aug. to Oct., to 40 ft., not much grown, China; *baldschuanicum*, white tinged pink, to 20 ft. annually, July to Oct., popular vigorous climber, Bokhara.

Polypodium (Polypody)—*Polypodiaceae*. Stove greenhouse and hardy evergreen and deciduous ferns.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, equal parts loam, peat, leaf-mould and silver sand. Pot, Feb. to April. Position, pots, baskets or rock beds. Shade from sun essential. Moist atmosphere Feb. to Sept., moderately so afterwards. No syringing required. Water freely March to Sept., moderately Sept. to March. No stimulants. Temp. stove species, March to Oct. 65° to 75°, Oct. to March 55° to 65°; greenhouse, March to Oct. 55° to 65°, Oct. to March 40° to 50°.

CULTURE OF HARDY SPECIES: Soil, equal parts fibrous peat, decayed turf loam, leaf-mould and coarse silver sand for *P. vulgare* and vars. Position, *P. vulgare*, shady fernery, bank or rockery, other species anywhere in shade in ordinary soil. Plant, April. Water in dry weather. Top-dress annually in April with above compost.

POT CULTURE OF HARDY SPECIES: Compost, as above. Pot, March. Position, shady, airy, cold greenhouse, pit or frame. Water evergreen kinds freely in summer, moderately at other times; deciduous kinds freely whilst growing occasionally after foliage dies down. Repot annually.

PROPAGATION: By spores sown on surface of shallow pan or box filled with fine sandy peat covered with pane of glass and placed in temp. 65° to 75°; division of roots in March or April.

STOVE SPECIES CULTIVATED: *P. comans* (syn. *P. conjugatum*), Trop. Asia; *heracleum*, Java; *Meyenianum*, 'Bear's Paw Fern', Philippines; *musifolium*, Malaya; *pectinatum*, W. Indies; *persicifolium*, Malaya; *Phymatodes*, E. India; *plumula*, W. Indies; *punctatum*, Old World Tropics; *verrucosum*, Philippines.

GREENHOUSE SPECIES CULTIVATED: *P. argutum*, fronds slender, dark green, to 3 ft., Nepal; *aureum*, W. Indies; *brasiliense* (syn. *Goniophlebium albo-punctatum*), fronds broad to 2 ft., Brazil; *Billardi*, Australia; *Catharinae*, nearly erect to 1½ ft., Brazil; *fraxinifolium* (syn. *Goniophlebium deflexum*), 1½ ft., Brazil; *lepidopteris* (syn. *Goniophlebium sepultum*), narrow fronds to 1½ ft., S. America; *piloselloides*, creeping, W. Indies; *pustulatum*, 'Scented Polypody', Australia and New Zealand; *subauriculatum* (syn. *Goniophlebium subauriculatum*), drooping fronds to 6 ft., good for large stout baskets, Java.

HARDY SPECIES CULTIVATED: *P. vulgare*, 'Adder's Fern', 'Common Polypody', Britain, etc., and many vars.

Polypody, see Polypodium.

Polyscias—*Araliaceae*. Stove evergreen and ornamental foliage plants and shrubs. First introduced mid-seventeenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould, charcoal and sand. Pot, Feb. to April. Water freely March to Oct., moderately afterwards. Temp., March to Sept. 70° to 80°, Sept. to March 60° to 70°.

PROPAGATION: By cuttings and portions of the roots in sandy soil in warm propagating frame in April.

SPECIES CULTIVATED: *P. Balfouriana* (syn. *Aralia Balfourii*), leaves green and creamy white, New Caledonia; *dissecta*, leaves finely segmented, origin unknown; *filicifolia*, fern-leaved, Pacific Islands; *fruticosa*, handsome pinnate leaves, Trop. Asia; *Guilfoylei*, 'Wild Coffee', 'Coffee Tree', Polynesia, and vars. *laciniata*, *monstrosa*, and *Victoriae*. See also *Nothopanax* and *Pseudopanax*.

Polystachya—*Orchidaceae*. An epiphytic genus, chiefly African and Eastern but represented in America. Very varied. Pseudo-bulbs pronounced in some, as thickened, often leafy, stems in others. Many are small-growing. The spikes are terminal. Flowers small, usually inverted, one to many. A few species are noteworthy from the bright colour and number of their blooms.

CULTURE: Compost, half osmunda or similar fibre, half sphagnum moss with sand and a few decayed leaves. Small pots or pans should be used. Species from the tropics should have a winter temp. of 65° to 70° . From cooler districts especially, if decided pseudo-bulbs are present, 55° to 60° is sufficient on winter nights. Temps. in summer, higher for all, with shading and moisture. Water freely in summer but decide winter waterings by the nature of the stems or bulbs.

PROPAGATION: By division of plants in spring. *P. paniculata* has been raised from seed.

SPECIES CULTIVATED: A selection—*P. affinis* (syn. *P. bracteosa*), many, yellow, brown marked and suffused, summer, W. Africa; *cucullata* (syn. *P. grandiflora*), 1 to 3, comparatively large, greenish-yellow, marked dull purple, summer, autumn, Sierra Leone; *leonensis*, light green, suffused purplish, lip whitish, autumn, Sierra Leone; *luteola*, often branched, yellowish-green, fragrant, various, Trop. America; *paniculata*, scape branched, small, many, red-orange and yellowish, various, Uganda; *Pobeguinii* (syn. *Epiphora pubescens*), scape long, many, rose-crimson, lip darker, shallow pan or raft, summer, Guinea.

Polystichum—*Polypodiaceae*. Stove greenhouse and hardy ferns. This genus includes many previously classed as *Aspidium* and *Lastrea*. Heights vary from 1 to 3 ft.

CULTURE OF STOVE AND GREENHOUSE SPECIES: Compost, two parts peat, one part loam, silver sand and charcoal. Pot, March. Water freely in summer, moderately in winter. Shade from sun. Temp. for stove species, Sept. to March 60° to 70° , March to Sept. 55° to 65° .

CULTURE OF HARDY SPECIES: Compost, equal parts loam, peat, leaf-mould and coarse silver sand. Position, shady or partially shady spots. Plant in Oct. or April. Water freely in dry weather.

PROPAGATION: Stove and greenhouse species by spores sown in sandy peat any time; division in March. Hardy species by division of crowns in April, also by spores sown on sterilised loam and kept close under glass cover.

STOVE SPECIES CULTIVATED: *P. amabile*, India and Japan; *echinatum*, Jamaica; *macrophyllum*, Brazil and W. Indies; *viviparum*, W. Indies.

GREENHOUSE SPECIES CULTIVATED: *P. adiantiforme*, Tropics; *hispidum* (syn. *Nephrodium hispidum*), New Zealand; *lepidocaulon*, Japan; *pungens*, Cape Colony; *triangulum*, N. India; *vestitum*, New Zealand, Chile, etc.

HARDY SPECIES CULTIVATED: *P. acrostichoides*, N. America; *aculeatum*, Europe (Br.), and numerous vars.; *Lonchitis*, Europe (Br.); *munitum*, N. America.

Pomaderris—*Rhamnaceae*. Greenhouse flowering shrubs. First introduced early nineteenth century.

CULTURE: Equal parts sandy loam, peat and leaf-mould with sharp sand to ensure porosity. Position, well-drained pots or beds in greenhouse or conservatory. Pot or plant, March or April. Prune in Feb. or March. Temp., March to Sept. 65° to 75° , Sept. to March 55° to 65° . Water moderately Oct. to Feb., freely at other times. Syringe freely except when in flower. Feed liberally with liquid or artificial manure when established.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy soil under bell-glass in temp. 65° to 70° .

SPECIES CULTIVATED: *P. apetala*, greenish, June, 3 to 6 ft., Australia, New Zealand; *elliptica*, pale yellow, May and June, 6 ft., Australia, New Zealand; *phyllocaefolia*, pale yellow, April, 2 ft., New Zealand.

Pomegranate, see *Punica Granatum*.

Poncirus (Hardy Orange)—*Rutaceae*. Hardy deciduous spiny shrub, allied to the orange. Formerly included in *Aegle*. Used as a rootstock for citrus fruits to improve their hardiness.

CULTURE: Deep, loamy soil. Position, sunny shrubberies or as a hedge plant.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in a frame or greenhouse in March; cuttings of half-ripened wood in a close frame in June or July.

SPECIES CULTIVATED: *P. trifoliata* (syns. *Aegle sepiaria*, *Citrus trifoliata*), white, small bitter fruits similar in appearance to oranges, sharply spined, May, 8 ft., China, Japan.

Pond Weed, see *Potamogeton*.

Pontederia—*Pontederiaceae*. Hardy aquatic perennials. First introduced late sixteenth century.

CULTURE: Soil, rich loam. Position, shallow ponds or tanks containing water 6 to 12 in. in depth. Plant, March to June.

PROPAGATION: By division of roots any time in spring.

SPECIES CULTIVATED: *P. cordata*, 'Pickerel Weed', blue, white, and green, summer, 2 ft., N. America, and var. *lanceolata* (syns. *P. angustifolia* or *P. lanceolata*), bright blue, not as hardy as the type, 4 to 5 ft.

Poor Man's Weather Glass, see *Anagallis arvensis*.

Popinac, see *Acacia Farnesiana*.

Poplar, see *Populus*.

Poppy, see *Papaver* and *Meconopsis*; **Californian**-, see *Eschscholtzia californica*; **Californian Tree**-, see *Romneya Coulteri*; **Horned**-, see *Glaucium*; **-Mallow**, see *Callirhoe*; **Matilija**-, see *Romneya Coulteri*; **Plume**-, see *Macleaya cordata*; **Prickly**-, see *Argemone mexicana*; **Sea**-, see *Glaucium*; **Tree**-, see *Dendromecon*.

Populus (Poplar)—*Salicaceae*. Hardy deciduous trees. Flowers, catkin-shaped, March and April. Wood, soft, yellow or white; used for toy-making, spade handles, etc. Weight of timber per cubic foot, 30 lb.

CULTURE: Soil, ordinary, moist. Position, margins of ponds, lakes, rivers, moist shrubberies or woods. *P. deltoides* and *P. nigra italica*, good trees for forming screens in town or suburban gardens. Plant, Oct. to Feb. For screens, plant 4 to 6 ft. apart. Prune, Nov. to Feb. Dry soils not suitable.

PROPAGATION: By cuttings of firm shoots, 8 in. long, inserted in ordinary soil outdoors in Oct. or Nov.; layering shoots in Oct.; suckers, Oct. to Feb.; weeping kinds by grafting on common poplars in March.

SPECIES CULTIVATED: *P. alba*, 'White Poplar', 'Abele', leaves green above, white beneath, 50 to 90 ft., Europe (Br.), N. Asia, etc., and vars. *Richardii*, leaves dull yellow above, white beneath, and *Bolleana*, 'White Pyramidal Poplar'; *angulata*, heart-shaped leaves, 60 to 80 ft., probably hybrid; *berolinensis*, 'Berlin Poplar', vigorous, columnar shape, to 70 ft., hybrid; *canadensis*, 'Carolina Poplar', hybrid, and vars. *aurea*, leaves yellow, *marilandica*, vigorous quick growth, and *serotina*, to 100 ft., wide-spreading, ascending branches; *candicans*, 'Balm of Gilead', very fragrant young foliage, 60 to 90 ft., origin unknown; *canescens*, 'Grey Poplar', grey leaves, branches and trunk to 100 ft., W. Europe, including Britain; *deltoides* (syns. *P. balsamifera*, *P. monilefera*), 'Balsam Poplar', 'Cottonwood', young foliage pleasantly balsam-scented, 70 to 100 ft., N. America; *Fremontii*, 'Fremont's Cottonwood', 50 to 90 ft., California; *generosa*, very vigorous hybrid; *lasiocarpa*, immense leaves, red stalks, 40 to 60 ft., Cent. China; *laurifolia*, good for heavy soils, 40 to 50 ft., Siberia; *Maximowiczii*, large leathery leaves, white beneath, 70 to 90 ft., N.E. Asia and Japan; *nigra*, 'Black Poplar', not so common as vars. *betulifolia*, 'Downy Black Poplar', to 100 ft., *italica*, 'Lombardy Poplar', well-known columnar tree, to 125 ft., and *thevestina*, similar to Lombardy but with a white trunk; *suaveolens*, balsam odour, 50 ft., Siberia; *tremula*, 'Aspen', perpetually quivering leaves, 40 to 50 ft., Europe, including Britain, with vars. *pendula*, 'Weeping Aspen' and *purpurea*, purple-tinged foliage; *tremuloides*, 'American Aspen', not frequent in Britain, 50 to 100 ft., N. America; *trichocarpa*, 'Western Balsam', 'Black Cottonwood', the best of the Balsam Poplars, very quick growing, 75 to 150 ft., Western N. America.

Porcupine Rush, see *Scirpus Tabernaemontani* var. *zebrinus*.

Portlandia—*Rubiaceae*. Stove evergreen flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts fibrous loam and leaf-mould and half a part silver sand. Pot, Feb. or March. Position, well-drained pots in partially shaded part of stove. Prune into shape immediately after flowering. Water copiously April to Sept., moderately afterwards. Syringe twice daily March to Oct., once afterwards. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 70°.

PROPAGATION: By cuttings of firm shoots, 2 to 3 in. long, inserted in sand under bell-glass in temp. 75° to 85° in summer.

SPECIES CULTIVATED: *P. coccinea*, scarlet, June, 2 to 3 ft., Jamaica; *grandiflora*, white, June, fragrant, 8 to 10 ft., W. Indies; *platantha*, white, summer, 1½ to 3 ft., habitat uncertain.

Portugal Laurel, see *Prunus lusitanica*.

Portulaca—*Portulacaceae*. Hardy and half-hardy annual flowering and edible-leaved plants. Leaves of purslane form an excellent summer salading. First introduced late sixteenth century.

CULTURE OF HALF-HARDY ANNUAL SPECIES: Soil, good ordinary. Position, sunny rockeries, raised beds or borders. Sow seeds thinly on surface of light, sandy soil in well-drained pot, box or pan, lightly cover with fine soil, and place in temp. 55° in March. Transplant seedlings when three leaves have formed into 2 in. pots, gradually harden off, and plant outdoors end of May. Water in dry weather. Plant 6 in. apart each way.

POT CULTURE: Compost, equal parts loam, leaf-mould, with a little silver sand. Raise plants from seeds as advised above. Transplant four seedlings into 5 in. pots, well-drained and filled with above compost. Grow near glass in temp. 55° to 65°. Water freely. Apply weak stimulants when in flower.

CULTURE OF PURSLANE: Soil, light, rich ordinary. Position, sunny, well-drained borders. Sow seeds thinly broadcast, middle of April, lightly rake in and keep well watered. To ensure a succession, sow at intervals of a month up to Aug. Gather shoots when 2 to 3 in. long, cutting them off close to the ground.

SPECIES CULTIVATED: *P. grandiflora*, 'Sun Plant', red, yellow, rose, or white, 6 in., Brazil, and vars. *compacta*, various colours, *Thellusonii*, orange-scarlet, *Thornburnii*, yellow, and many others; *oleracea*, 'Purslane', June, 6 in., Tropics.

Posoqueria—*Rubiaceae*. Stove evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, one part loam, one part peat, one part well-decayed manure and charcoal. Position, well-drained pots, or beds in plant stove. Pot or plant, Feb. or March. Prune into shape, Feb. or March. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 65°. Water moderately Oct. to Feb., freely afterwards. Syringe daily (except when in bloom) March to Sept. Apply liquid manure occasionally to healthy plants in flower. Plants one to two years old produce the best blooms.

PROPAGATION: By cuttings of firm young side shoots, 2 to 3 in. long, inserted in well-drained pots of sandy peat under bell-glass in temp. 75° to 85°, Jan. to April.

SPECIES CULTIVATED: *P. formosa*, white, fragrant, summer, 15 to 20 ft., Venezuela; *fragrantissima*, white, fragrant, summer, 8 to 10 ft., Brazil; *latifolia*, white, Oct., 6 ft., Trop. America.

Potamogeton (Pondweed)—*Potamogetonaceae*. Large genus of hardy, underwater aquatics, used in pools and rivers for oxygenating water and as cover for fish.

CULTURE: Soil, mud at base of pond. Plant, spring to autumn, in boxes, or weight clumps of plant and sink in water.

PROPAGATION: By division.

SPECIES CULTIVATED: *P. crispus*, Britain; *pectinatus*, thread-like foliage, Europe; *perfoliatus*, bronze, Britain.

Potato, see *Solanum tuberosum*; **Sweet-**, see *Ipomoea Batatas*.

Potentilla (Cinquefoil)—*Rosaceae*. Hardy herbaceous perennials or sub-shrubs. The hybrid garden potentillas are the result of crosses between *P. argrophylla* and *P. nepalensis*.

CULTURE OF HERBACEOUS SPECIES: Soil, ordinary deep, rich, sandy. Position, sunny rockeries for dwarf species; sunny borders for tall. Plant, Oct., Nov., March or April. Mulch tall kinds with decayed manure annually in March. Water copiously in dry weather. Apply stimulants occasionally during flowering period. Lift, divide and replant border kinds in fresh soil every three or four years.

CULTURE OF SHRUBBY SPECIES: Soil, deep loam. Position, sunny shrubberies or borders. Plant, Nov. to Feb. Plants require abundant moisture. Mulch with strawy manure in May.

PROPAGATION: Herbaceous species by seeds sown $\frac{1}{8}$ in. deep in shallow pans or boxes of light, sandy soil in temp. 55° to 65°, March, transplanting seedlings outdoors in May or June, or similar depth in partially shaded border outdoors in April; division of roots, Oct., Nov., March or April; shrubby species by seeds treated as herbaceous kinds, or by cuttings of well-ripened wood during Aug. or Sept. in sandy soil in unheated frame.

ALPINE AND HERBACEOUS SPECIES CULTIVATED: *P. alba*, white, spring, 6 to 9 in., Europe (Br.); *alchemilloides*, white, summer, 9 to 12 in., Pyrenees; *alpestris* (syn. *P. Crantzii*), yellow, May to June, 6 in., Europe, Asia Minor, Caucasus, Arctic America; *argrophylla*, yellow, summer, 2 to 3 ft., Himalaya; *atrosanguinea*, crimson, 2 to 3 ft., summer, Himalaya; *aurea*, yellow, summer, 4 to 6 in., Europe, and var. *plena*, double; *Clusiana*, white, June, 6 in., Europe; *coriandrifolia*, yellow, 4 to 6 in., summer, Himalaya, Yunnan; *cuneata* (syn. *P. ambigua*), yellow, summer, 4 to 6 in., Himalaya; *Detommarii*, yellow, 4 in., Europe, Asia Minor; *eriocarpa*, yellow, June to July, 2 in., Himalaya; *fragiformis*, yellow, summer, 9 in., Asia, Alaska; *fulgens*, crimson, summer, 9 to 12 in., Himalaya; *grandiflora*, yellow, summer, 12 in. Pyrenees; *Griffithii*, yellow, June, 12 in., Himalaya; *Hippiana*, yellow, summer, 12 in., N. America; *Hopwoodiana*, yellow and rose, summer, 18 in., hybrid; *multifoliata*, flowers inconspicuous, foliage fern-like, 6 to 9 in., Arizona; *nepalensis*, rose-red, summer, 18 in., Himalaya, and vars. *Roxana*, salmon-red, and *Willmottiae*, vivid rose; *nevadensis*, yellow, summer, 4 in., Spain; *nitida*, rose, June to July, 2 in., Europe, and var. *alba*; *recta-macrantha* (syn. *P. Warrenii*), yellow, June to July, 12 to 15 in., *rupestris*, white, May to July, 12 in., Europe, and var. *pygmaea*; *Tonguei*, terra-cotta, summer, 3 in., hybrid; *verna*, yellow, summer, 4 to 6 in., Europe, and var. *nana*, dwarf.

SHRUBBY SPECIES CULTIVATED: *P. fruticosa*, widely distributed throughout Europe, Asia and America, to 4 ft., yellow, summer, many vars., for which see trade lists.

Poterium—*Rosaceae*. Deciduous low shrub with branched spines. For other plants listed as *Poterium*, see *Sanguisorba*.

CULTURE: Soil, ordinary. Position, sunny or shady borders.

PROPAGATION: By cuttings.

SPECIES CULTIVATED: *P. spinosum*, red, to 1 ft., branched, S. Europe.

Pratia—*Lobeliaceae*. Hardy herbaceous perennial trailing plants. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, two parts peat, one part leaf-mould, and little sand. Position, sunny well-drained rockeries. Plant, March or April. Water freely in dry weather.

POT CULTURE: Compost, two parts sandy loam, half a part each leaf-mould and silver sand. Pot, March. Position, cool or cold greenhouse, frame or window. Water freely April to Sept., moderately afterwards. Apply weak stimulants occasionally when flowering. Shade from midday sun.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in equal parts loam, leaf-mould and sand in temp. 85°, March; cuttings of young shoots inserted in well-drained pots,

July to Sept., and stored in cold frame or greenhouse until March, then planted outdoors.

SPECIES CULTIVATED: *P. angulata* (syn. *Lobelia littoralis*), white, summer, 1 in., New Zealand; *nummularia* (syns. *P. begonifolia*, *Lobelia begonifolia*); *begonifolia* (syn. *Lobelia begonifolia*), blue, summer, Himalaya; *Treadwellii*, white, purple berries, creeping, New Zealand.

Prickly Ash, see *Zanthoxylum americanum*; **-Heath**, see *Pernettya*; **-Pear**, see *Opuntia*; **-Phlox**, see *Gilia californica*; **-Poppy**, see *Argemone mexicana*; **-Thrift**, see *Acantholimon*.

Primula (Primrose)—*Primulaceae*. Greenhouse and hardy perennial plants. First introduced late sixteenth century.

CULTURE OF GREENHOUSE SPECIES: Sow seeds of *P. sinensis* and *P. obconica* from April to June, *P. malacoides* June to July, on surface of compost of two parts leaf-mould, one part loam and half a part sand pressed moderately firmly in a shallow pan, or 6 in. pot half filled with drainage material, cover seeds thinly with similar soil. Place pane of glass over pot and put in temp. 55° to 60°. Shade from sun and keep just moist. Transplant seedlings when large enough to handle 1 in. apart in well-drained pots or pans filled with same compost. When leaves of seedlings meet each other, place singly in 3 in. pots, keep in same temp. for a week then transfer to cold frame. Shade from sun, admit air freely and sprinkle foliage in evening. Transfer when well rooted to 5 in. pots filled with compost of one part fibrous loam, half a part each leaf-mould and decayed cow manure and half a part silver sand. Replace in frame, shade from sun, water moderately and sprinkle foliage as before. Apply liquid soot and cow or sheep manure twice a week when well rooted. Water freely and remove to temp. 50° to 55° in Sept. Admit air freely on fine days. When potting allow base of leaves just to touch the compost, pot moderately firmly. Apply artificial manure twice weekly to plants established in flowering pots. Temp. for flowering *P. sinensis*, 50° to 55°; *P. obconica* and *P. malacoides*, 45° to 55°. Single-flowered kinds are best raised from seed annually, rejecting old plants after flowering. Sow in June for spring flowering.

CULTURE OF HARDY SPECIES: Soil, open sandy loam containing peat and leaf-mould. Position, shaded rock gardens, beds or borders. Cool, shady banks and glades in rock garden for *P. farinosa*, *P. frondosa*, *P. glutinosa*, *P. Juliae* and *P. scotica*. Light, well-drained, peaty loam with plenty of sand and stone chippings in open position on sunny banks or crevices of rock garden for *P. carniolica*, *P. Clusiana*, *P. cottia*, *P. deorum*, *P. glaucescens*, *P. hirsuta*, *P. integrifolia*, *P. marginata*, *P. minima*, *P. Palinuri*, *P. pedemontana*, *P. spectabilis*, *P. viscosa* and *P. Wulfeniana*. All require abundant moisture. *P. Allionii*, *P. carniolica*, *P. Forrestii*, *P. frondosa*, *P. hirsuta*, *P. marginata*, *P. Menziesiana*, *P. nutans*, *P. pedemontana*, *P. Reidii*, *P. Reinii* and *P. Waltonii* are suitable for alpine house. The following species are suitable for waterside planting: *P. alpicola*, *P. aurantiaca*, *P. Beesiana*, *P. Bulleyana*, *P. burmanica*, *P. denticulata*, *P. Florindae*, *P. helodoxa*, *P. japonica*, *P. mollis*, *P. pulverulenta*, *P. rosea*, *P. sikkimensis*, *P. Veitchii*, *P. Waltonii*. Plant, Sept. to Oct. or March to April. Mulch beds containing choice kinds with decayed manure or compost in Feb. Lift those used for bedding directly after flowering, divide and replant 6 in. apart each way in shady border until Sept., then replant in beds.

POT CULTURE: Compost, two parts turfy loam, one part cow manure and leaf-mould, half a part silver sand. Position, airy frame or cool greenhouse in 3 in. pots. Pot, Feb. or March. Water moderately in winter, freely other times, apply weak liquid manure to plants in flower.

CULTURE OF AURICULA: Alpine type have blooms one colour, white or yellow eye, stems smooth and free from powder. Florists' type, stems and blooms covered with mealy powder, blooms with more than one colour, and white-, grey- or green-edged petals. Properties of Florists' Auriculas, stem erect, elastic, carrying truss well above foliage; stalk proportionately long to size of petals; pips (blooms), seven to each truss, round; anthers, bold; eye, white, smooth and round; colour,

well defined, rich; edges, distinct. Compost, two parts turfy loam, one part cow manure and leaf-mould, half a part silver sand. Position, choice kinds in 3 in. pots in airy frame or cool greenhouse; others in rich soil in shady borders. Pot and plant, Feb. or March. Water those in pots moderately in winter, freely other times. Top-dress with rich soil in March plants that were not repotted. Apply liquid manure in weak solution to plants in flower.

CULTURE OF PRIMROSE AND POLYANTHUS: Soil, ordinary rich, moist. Position, partly or wholly shaded beds and borders. Plant, Oct. to Nov., Feb. to March. Mulch surface of beds containing choice kinds with rotted manure or compost in Feb. Lift those used for bedding directly after flowering, divide and replant 6 in. apart each way in shady border until Oct. then replant in beds. Polyanthus Classification: Gold-laced, centre and edges of bloom golden; fancy, blooms of various hues; hose-in-hose, semi-double, one bloom growing out of another; Jack-in-the-Green, bloom surrounded by a collar-like calyx; pantaloons, small, curiously coloured blooms.

PROPAGATION: By seed or division.

GREENHOUSE SPECIES CULTIVATED: *P. floribunda*, yellow, winter and spring, 9 in., Himalaya; *Forbesii*, rose or lilac, winter and spring, 12 in., China; *kewensis*, yellow, winter and spring, 9 to 12 in., hybrid; *malacoides*, lilac and rose, winter and spring, 12 to 18 in., China, and many vars.; *obconica*, lilac, winter and spring, 6 to 9 in., China, and vars. with white, pink, red and magenta flowers; *sinensis*, 'Chinese Primrose', various, winter and spring, 9 in., China; *verticillata*, yellow, spring, 12 to 15 in., Arabia.

HARDY SPECIES CULTIVATED: *P. Allionii*, pink, spring, 2 in., Maritime Alps; *alpicola*, yellow, fragrant, 18 to 24 in., summer, Tibet; *anisodora*, deep purple, summer, 12 to 15 in., Yunnan; *amoena*, white to rich purple, spring, 9 to 12 in., Caucasus; *aurantiaca*, reddish-orange, summer, 9 to 12 in., China; *Auricula*, various, spring, 6 to 8 in., Alps; *auriculata*, red-purple, summer, 9 to 12 in., Asia Minor to Caucasus; *Beesiana*, rose-carmine, summer, 18 in., China; *Bulleyana*, orange, summer, 18 in., Yunnan; *burmanica*, reddish-purple, summer, 18 in., Burma; *capitata*, deep purple, fragrant, early summer, 9 to 12 in., Himalaya, Tibet; *carniolica*, rose, fragrant, spring, 4 to 6 in., Alps; *chionantha*, white, fragrant, summer, 12 to 15 in., Yunnan; *chungensis*, pale orange, summer, 12 in., Yunnan; *Clusiana*, rich rose, spring, 6 in., E. Alps; *Cockburniana*, rich orange, summer, 12 to 18 in., China; *cottia*, rose-pink, spring, 4 in., Cottian Alps; *denticulata*, white, spring, 12 to 15 in., China, and various coloured vars.; *deorum*, purple, spring, 6 in., Bulgaria; *elator*, 'Oxlip', yellow, spring, 9 in., Britain; *farinosa*, 'Bird's-eye Primrose', rose, spring, 4 to 6 in., Europe (Br.); *Florindae*, yellow, summer, 24 in., Tibet; *Forrestii*, yellow, summer, 12 in., Yunnan; *frondosa*, pink, spring, 6 in., Bulgaria; *geraniifolia*, red to deep pink, summer, 9 in., Himalaya; *glaucescens*, blue, spring, 4 to 6 in., Alps; *glutinosa*, purple, fragrant, spring, 4 in., Alps; *helodoxa*, 'Glory of the Marsh', yellow, summer, 2 to 3 ft., Yunnan; *heucherifolia*, red-purple, summer, 6 in., Himalaya; *hirsuta*, pink, lilac or white, 4 in., Alps; *integrifolia*, reddish-lilac, spring, 3 in., Alps; *involucrata*, white, fragrant, summer, 9 to 12 in., Himalaya; *japonica*, red, summer, 18 in., Japan, and many forms and vars.; *Juliae*, pink, spring, 2 to 3 in., Caucasus; *Juliana*, various, spring, 6 in., hybrid; *luteola*, sulphur-yellow, summer, 12 in., Caucasus; *marginata*, lavender, spring, 3 to 6 in., Alps; *Menziesiana*, purple, spring, 4 in., Bhutan; *minima*, pink, spring, 1 in., Alps; *mollis*, rose, 12 to 16 in., Himalaya; *Mooreana*, deep purple, summer, 9 in., Himalaya; *nutans*, deep lavender, fragrant, summer, China; *Palinuri*, yellow, spring, 9 in., S. Italy; *pedemontana*, pink, 2 to 3 in., spring, Alps; *Poissonii*, purple-crimson, summer, 12 to 18 in., China; *polyantha*, 'Polyanthus', various, spring, 9 to 12 in., hybrid; *Pruhoniana* (syns. *P. Julianae*, *P. Helenae*), lilac and magenta to white, Mar. to April, 1½ to 3 in., hybrid, many vars.; *pulverulenta*, red, summer, 12 to 18 in., China; *Reidii*, ivory-white, early summer, 4 to 6 in., Himalaya; *Reinii*, pink, 6 to 9 in., summer, Japan; *rosea*, crimson, spring, 6 to 9 in., Himalaya; *scotica*, bluish-purple, spring, 1 to 2 in., Scotland; *secundiflora*, deep rose-red, early

summer, 12 in., Yunnan; *sibirica*, lilac, summer, 12 in., Asia to N. Europe; *Szcholdii*, various, summer, 12 in., Japan; *sikkimensis*, yellow, summer, 12 in., Sikkim; *sinopurpurea*, summer, 12 to 15 in., Yunnan; *Smithiana*, yellow, summer, 18 in., Himalaya; *spectabilis*, rose pink, spring, 4 in., Alps; *sphaerocephala*, deep purple, summer, 9 to 12 in., China; *Veitchii*, rose-purple, early summer, 9 to 12 in., China; *veris* (syn. *P. officinalis*), 'Cowslip', yellow, spring, 6 to 9 in., Britain; *viscosa*, pink, fragrant, spring, 6 in., Alps; *vulgaris* (syn. *P. acaulis*), 'Primrose', yellow, spring, 4 to 6 in., Britain; *Waltonii*, violet, spring, Tibet; *Wilsonii*, purple, summer, 12 to 15 in., Yunnan; *Winteri*, lavender, winter, 3 to 6 in., Himalaya; *Wulfeniana*, purple, spring, 4 in., E. Alps; *yargongensis*, white to deep mauve, summer, 9 to 12 in., China. There are many beautiful hybrids.

Prince of Wales's Feather Fern, see *Leptopteris superba*.

Prince's Feather, see *Amaranthus hybridus* var. *hypochondriacus*.

Prinsepia—*Rosaceae*. Hardy deciduous flowering shrubs armed with spines. First introduced early twentieth century.

CULTURE: Soil, ordinary loamy. Position, open shrubberies or borders. Plant, Nov. to Feb.

PROPAGATION: By seeds stratified and sown the following March or April in drills in the open; cuttings of young wood in gentle bottom heat; layering in spring.

SPECIES CULTIVATED: *P. sinensis* (syn. *Phagiospermum sinense*), yellow, Feb. to March, 3 to 6 ft., Manchuria; *uniflora*, white, March, 3 to 4 ft., N.W. China.

Prionium (Palmiet)—*Juncaceae*. Stove aquatic with ornamental leaves resembling those of a pineapple, grassy inflorescence.

CULTURE: Soil, rich loam with a little bonemeal or rotted manure. Position, indoor tank or in pot standing in vessel of water. Temp., 60° or more.

PROPAGATION: Division of the runners spring or summer.

SPECIES CULTIVATED: *P. Palmita* (syn. *P. serratum*), white and green, 3 to 4 ft., Aug., S. Africa, Australia.

Pritchardia, see *Eupritchardia*.

Privet, see *Ligustrum*.

Proboscidea—*Martyniaceae*. Half-hardy annuals. Fruit edible and used for making pickles. First introduced early eighteenth century.

POT CULTURE: Compost, equal parts loam, leaf-mould, decayed manure and sand. Sow seeds 1 in. deep singly in 2 in. pots and place in temp. of 60°, Feb. or March. Transfer to 5 in. pots in April or May; to 6 or 7 in. pots in June. Pot firmly. Position, light, sunny greenhouse or window. Water moderately at first, freely when in full growth. Apply weak stimulants occasionally to healthy plants in flower. Temp., Feb. to May 60°, afterwards 55°.

OUTDOOR CULTURE: Soil, ordinary rich. Position, sunny, well drained, sheltered beds or borders. Sow seeds 1 in. deep singly in 3 in. pots, or 3 in. apart in shallow boxes of light soil in temp. of 60° in Feb. or March, transplanting seedlings 8 to 12 in. apart early in June. Mulch with refuse or decayed manure after planting. Water in dry weather.

SPECIES CULTIVATED: *P. fragrans*, 'Unicorn Plant', crimson-purple, summer, 2 ft., Mexico.

Promenaea—*Orchidaceae*. A small genus of pretty dwarf-growing epiphytes. At one time included in *Zygopetalum*. Habit similar in all, pseudo-bulbs small, clustered. Flowers comparatively large, usually one, sometimes two, freely produced on short, usually lateral, scapes, from pseudo-bulb bases.

CULTURE: Compost, as for *Odontoglossums*, in summer they enjoy the same temp. and atmosphere as *Odontoglossums*, but in winter should be infrequently watered and the temp. should not fall below 50° at night. Pans are preferable to pots and a position near the glass given, shading is required in summer.

PROPAGATION: By division of plants in late spring.

SPECIES CULTIVATED: *P. guttata*, yellow, dotted purple, purplish on base of lip, Brazil; *lentiginosa*, greenish-white, spotted purple lip with three teeth on crest, autumn, Brazil; *Rollisonii* (syn. *Maxillaria Rollisonii*), yellow, lip paler, thickly red-spotted, summer, Brazil; *stapelioides*, greenish-white, thickly spotted purple-brown, mid-lobe of lip purplish, summer, autumn, Brazil; *xanthina* (syns. *P. citrina*, *Zygopetalum xanthinum*), golden yellow or lighter, summer, Brazil.

Prophet Flower, see *Arnebia echioides*.

Proserpinaca (Mermaid Weed)—*Haloragidaceae*. Hardy oxygenating aquatics for pool or cold water aquariums. Ornamental foliage—floating leaves differ from submerged. First introduced early nineteenth century.

CULTURE: Plant in pots and lower into water or weight each piece separately with small pieces of lead. Soil, sandy loam. Plant, spring.

PROPAGATION: Soft cuttings in shallow bowls of loam covered with 2 in. of water, or by division.

SPECIES CULTIVATED: *P. palustris*, green and white, July, N. America.

Prostanthera—*Labiatae*. Greenhouse flowering evergreen shrubs. First introduced early nineteenth century.

CULTURE: Compost, peaty loam and sand. Position, large well-drained pots in unheated greenhouse. Water freely during summer, moderately in spring and autumn, little in winter. Pot, Sept. to Oct. or April to May. *P. lasianthos* and *P. rotundifolia* may be grown in favoured districts out of doors when given the protection of a south wall.

PROPAGATION: By cuttings of young growth in sandy soil under bell-glass with gentle bottom heat.

SPECIES CULTIVATED: *P. lasianthos*, white, tinged red, June, 3 to 6 ft., Australia; *nivea*, white, May, 3 to 6 ft., Australia; *rotundifolia*, purple, May to June, 3 ft., Australia; *Sieberi*, lavender, March or April, 5 to 8 ft., Australia, Tasmania.

Protea—*Proteaceae*. Greenhouse evergreen shrubs; flowers enclosed in coloured bracts. First introduced mid-eighteenth century.

CULTURE: Compost, two parts light, well-decayed, turfy loam, one part equal proportions silver sand, charcoal, broken pots, freestone and peat. Position, light, airy greenhouse fully exposed to sunshine. Pot, March. Drain pots one-third of depth with broken potsherds. Pot firmly. Water moderately March to Sept., occasionally afterwards, keeping soil just moist. No syringing or stimulants required. Keep plants in sunny position outdoors during June, July and Aug. Temp., Sept. to March 40 to 50°, March to June 55° to 65°.

PROPAGATION: By cuttings of firm shoots cut off close to a joint, pared quite smooth, inserted thinly in small pots half filled with drainage, and remainder with pure sand, placed under bell-glass in cool part of greenhouse in summer.

SPECIES CULTIVATED: *P. cordata*, purple, spring, 18 in., S. Africa; *cynaroides*, white, Aug., 1 ft., S. Africa; *grandiceps*, bracts red to purplish, beard white, purple, orange-black, to 5 ft., S. Africa; *longiflora*, pink, early spring, 6 ft., S. Africa.

Prunella (Selfheal)—*Labiatae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary light, rich. Position, border or rockery. Plant, Oct. Nov., March or April. Lift, divide and replant every two or three years. Water in dry weather. Mulch with decayed manure in March.

PROPAGATION: By division of roots, Oct., Nov. or March.

SPECIES CULTIVATED: *P. grandiflora*, purple, July and Aug., 6 in., Europe, and vars. *alba* and *rubra*; *vulgaris laciniata*, purple, July, leaves finely cut, 1 ft., Britain; *Webbiana*, purple, summer, 6 in., botanical position uncertain.

Prunus—*Rosaceae*. A large genus of hardy shrubs and trees, mostly deciduous; the majority produce edible fruits with single stone.

CULTURE OF PEACH AND NECTARINE: (a) On walls outdoors. Soil, deep but not over-rich sandy loam, well-drained, and free from manure, to which has been

added a generous supply of lime, preferably mortar rubble. Position, south or south-west walls fully exposed to sun. Height of wall, 12 to 14 ft. Plant, Oct. to Feb. Distances for planting, 15 ft. Depth of soil above roots, 4 to 6 in. Prune, Jan. or Feb. Spray with Bordeaux mixture or colloidal copper after pruning as a preventive of peach leaf curl. Fruit borne on shoots of previous year's growth. Do not shorten the latter unless very strong. Always cut back if possible to a triple bud. Train previous year's shoots 2 to 3 in. apart all over tree. Remove shoots annually that have borne fruit to make room for new ones. Fruit buds, conical, downy. Wood buds, pointed, narrow. Disbud, i.e. rub off young shoots, April, May and June, removing those growing out of front and back of branches, leaving one as replacement at base, one central and one extension shoot. Train young shoots to the wall when 3 to 6 in. long. Protect blossoms from frost by covering of tiffany or hessian in Feb. and March. Ensure pollination of flowers when open by dusting with a rabbit's tail each day for ten days. Thin fruit, when size of a hazel-nut, to 3 or 4 in. apart; again, when size of a walnut, to 10 to 12 in. apart. Average number of fruit for a full-grown tree to carry, about 240. Mulch established fruiting trees with decayed manure in March or April. Apply stimulants occasionally April to Aug. Vars. recommended—Peach: Hales Early, Peregrine, Bellegarde. Nectarine: Early Rivers, Lord Napier, Pineapple.

(b) In the open outdoors. May be grown successfully as bush or standard in the open in warmer gardens which do not lie in frost pockets. Plant 20 ft. apart and after shape of tree is formed, little pruning required, but always cut out dead wood. Heavy crops easily grown in this manner.

(c) Under Glass. The border should be about 10 ft. wide and soil dug out about 2 ft. 9 in. deep. Unless natural gravel subsoil, bottom must be concreted and drained. When planting young trees, first restrict border to about 5 ft., building a temporary turf wall to retain soil. Compost, fairly heavy loam best, chopped with a spade, with one barrow-load mortar rubble to each ton of soil, and a light dusting of $\frac{1}{4}$ in. bones. Enlarge to 8 ft. wide in third season. Once trees are established never allow border to become dry. Water well about once weekly and syringe the foliage twice daily. When carrying heavy crops manure water may be applied. Thin fruit as recommended for outdoor crops in two operations, leaving finally one fruit per sq. ft. of glass. The following temps. should be followed as closely as possible. Starting, 45° to 50°; flowering, 50° to 55°; first swelling, 55° to 60°; stoning, 60° to 65°; second swelling, 65° to 70°; ripening, 70° to 75°. These figures are for day, and may be dropped by 5° for night. Fire heat rarely needed before flowering. Do not syringe during flowering period, pollinate the flowers daily with rabbit's tail, or tap branches of free setters. After fruit is gathered, syringe freely to retain foliage as long as possible. When leaves have dropped, pruning should be done; this is simplified if disbudding has been properly done. Both operations as for outdoor trees. Discontinue fire heat after leaf-fall and if growth was unsatisfactory, top-dress the border. Following vars. recommended—Peaches: early, Alexander and Hales Early; mid-season, Noblesse and Bellegarde; late, Barrington and Sea Eagle. Nectarines: early, Early Rivers and Lord Napier; mid-season, Humboldt and Pineapple; late, Milton and Victoria. Note: It is strongly recommended that all peaches and nectarines indoors and outdoors should be sprayed every year whilst dormant (Dec. to Jan.) with tar oil wash (1 pint to 2½ gall. water) against leaf-curl, greenfly and scale insects.

PROPAGATION: By budding. The St. Julien plum is often recommended as a suitable rootstock for heavy soils and the almond for light. Peach seedlings may also be used.

CULTURE OF MYROBALAN PLUM: Used chiefly for hedges; occasionally as a stock for plums. Soil, ordinary. Position, sunny. Plant, Oct. to Feb. Distance apart to plant, 6 in. Plant out when two years old. Trim into shape, June or July. Makes an impenetrable hedge.

CULTURE OF PORTUGAL AND CHERRY LAURELS: Soil, good ordinary. Position, mixed shrubberies or hedges for cherry laurel; lawns or shrubberies for Portugal

laurel. Plant, Sept. to Oct. or in May. Prune in April, merely shortening straggly growths.

HEDGE CULTURE OF CHERRY LAUREL: Trench site 3 ft. wide and 2 ft. deep, mixing plenty of rotted manure with soil. Plant, 12 to 24 in. apart. Prune in April.

CULTURE OF FLOWERING SPECIES: Soil, ordinary. The majority of *Prunus* will grow more satisfactorily if provided with lime. Position, well-drained, sunny borders or shrubberies; almonds good town trees. Plant, Oct. to Feb. Prune only to cut away dead wood, or to shorten straggly growths after flowering.

POT CULTURE OF P. TRILOBA: Compost, two parts sandy loam, one part leaf-mould, half a part silver sand. Position, cold greenhouse, Jan. to June; outdoors, pots plunged to rim in garden soil, June to Nov.; sheltered corner or pit, Nov. to Jan. Pot, Nov. Repot annually. Water freely March to Oct., moderately afterwards. Apply stimulants occasionally April to Sept. Temp. for forcing, 55° to 65°. Prune severely after flowering.

PROPAGATION: Cherry by budding in July or Aug. on the Mahaleb cherry for dwarfs, or seedling cherry for standards; plums by budding in July or Aug. on the Brussel, Pershore, Common Plum, Myrobalan, St. Julien, Brompton and Common Mussel; damsons by seed; almonds by budding on seedling plums; other species by budding on the Myrobalan plum; laurels and Myrobalan plum by cuttings inserted in sheltered border or cold frame in autumn; flowering species by cuttings of half-ripened wood taken with a heel in July and Aug. and struck in sandy soil under bell-glass in gentle bottom heat. All kinds by seeds to produce new vars.

ORNAMENTAL SPECIES AND VARS. CULTIVATED: For the sake of simplicity these are dealt with in their separate sections.

SPECIES OF ALMONDS AND PEACHES: *P. Amygdalus*, 'Almond', pale pink, March, April, 20 to 30 ft., S. Europe and Algeria, with vars. *Pollardii* large flowered, fine form, edible fruits, *amara*, 'Bitter Almond', *dulcis*, 'Sweet Almond', and *pendula*, weeping; *Davidiana*, white, Jan. to March, 20 to 30 ft., China; *Persica*, 'Peach', pale pink, April, 20 to 30 ft., China, not as freely grown as double-flowered vars., e.g. *sanguinea plena*, carmine, *flore albo*, and *plena*, double white; *Pollardii*, fine hybrid between almond and peach, large, bright pink flowers, March, April, 25 ft.; *tenella* (syn. *P. nana*), 'Dwarf Russian Almond', rosy red, April, 3 to 5 ft., S. Russia and S.E. Europe, with vars. *alba*, white, and *Gessleriana*, larger flowered; *triloba* (generally as double form, *P. triloba multiplex*), fine shrub, pink, March, April, prune hard after flowering, useful as small standard, 12 ft., China.

SPECIES OF CHERRIES: *P. avium*, 'Geau' or 'Mazzard', white, April, 30 to 60 ft., Europe, including Britain, with vars. *plena*, double, and *pendula*, weeping; *Cerasus*, 'Double Wild Dwarf Cherry', May, white, 10 to 20 ft., Europe, var. *Rhezi*; *Conradinae*, pale pink, Feb., March, 25 to 30 ft., Cent. China, with var. *semitplena*, 20 to 25 ft., double flowers, a better form; *incisa*, white, March, April, 6 to 15 ft., spreading, stands pruning, Japan; *japonica*, white to pale pink, April, 4 ft., Cent. China, with var. *flore pleno*, double, much forced by florists, and a good garden plant; *Mahaleb*, 'St. Lucie Cherry', white, in clusters, very fragrant, April, May, 30 to 40 ft., Cent. and S. Europe, with vars. *monstrosa*, dwarf, and *pendula*, beautiful semi-weeping form; *Sargentii*, rose pink, April, 20 to 40 ft., coloured spring and autumn foliage, Japan; *serrulata*, 'Japanese Cherry', in numerous vars., generally grown as standards, making trees 15 to 30 ft., flowering April to May, as 'Amanagowa' (*erecta*), semi-double, pink, very erect habit; 'Fugenzo' ('J. H. Veitch'), double, deep pink, spreading habit; 'Hokusai' (*roseo pleno*), semi-double, pale pink; 'Kiku Shidare' (*rosea* or 'Cheal's Weeping'), double pink, early; 'Kwanzan' ('Hisakura'), most popular, deep rose pink, young foliage copper, strong upright habit; 'Miyako' (*longipes* or 'Shimidsu sakura'), double white, fragrant, late flowering, spreading habit; 'Sirotac', semi-double, white, early; 'Tai-haku', very fine var., large white, single, quick-growing, upright habit; 'Ukon' (*grandiflora*), semi-double, pale

sulphur, sparse habit, and 'Yoshino', pink in bud to white, very free, March, April, with var. *pendula*, beautiful weeping form; *subhirtella*, 'Spring Cherry' or 'Higan Sakura', very free and beautiful, pale pink, April, 20 to 30 ft., Japan, with vars. *ascendens*, upright habit, *autumnalis*, Nov. to Dec. flowering, *pendula*, 'Weeping Rose-bud Cherry', and *pendula rubra*, similar, red flowered; *tomentosa*, 'Downy Cherry', pale pink, March, April, 4 to 6 ft., prune after flowering, N. and W. China.

SPECIES OF PLUMS: *P. cerasifera*, 'Cherry Plum', 'Myrobalan', white, Feb. to March, 15 to 25 ft., W. Asia, Caucasus, with var. *atropurpurea* (syn. var. *Pissardii*), popular tree, pink, March, brownish-claret foliage; *Bleiriana*, similar but less strong and double flowered; *nigra*, best form, deeper-coloured flowers and foliage; *insititia*, 'Bullace', to 20 ft., Europe, including Britain; *spinosa*, 'Sloe', 'Blackthorn', March, white, 8 to 15 ft., Europe, including Britain.

SPECIES OF APRICOTS: *P. Armeniaca*, 'Apricot', white or pale pink, March, to 20 ft., N. China, with ornamental var. *Ansu*, double, deeper pink; *dasycarpa*, 'Black Apricot', probably hybrid between plum and apricot, white to pale pink, March, April, 20 to 25 ft., Japan, with vars. *alba*, white, *alba plena*, double white, and *pendula*, weeping.

SPECIES OF BIRD CHERRIES: *P. cornuta*, 'Himalayan Bird Cherry', white, May, 40 to 50 ft., Himalaya; *Virginiana*, 'Western Choke Cherry', white, May, purple fruits, 20 to 30 ft., Western N. America; *Padus*, 'Bird Cherry', good woodland tree, white, fragrant, May, 30 to 50 ft., N. Europe, including Britain, N. Asia to Japan, with vars. which are superior garden forms, as *commutata*, early flowering, *plena*, good semi-double form, and *Watereri*, probably best form, single; *serotina*, 'Black Cherry' or 'Rum Cherry', white, May, black fruits, bright leaves, 30 to 60 ft., N. America.

SPECIES OF CHERRY LAURELS (these are all evergreen): *P. Laurocerasus*, 'Cherry Laurel', quick-growing tree for screening or shelter in shady places, making handsome hedge or single specimen, dull white flowers, fruit black, to 20 ft. high, more in width, E. Europe and Asia Minor, with numerous vars., *caucasica*, fine large-leaved form, *magnoliaefolia*, leaves up to 12 in. long, *Mischiana* (dwarf form), *rotundifolia*, good for hedging, *schipkaensis*, pyramidal habit, very hardy, and *Zabeliana*, dwarf spreading, hardy; *lusitanica*, 'Portugal Laurel', hardy, useful for hedging, white, June, 10 to 25 ft., Spain and Portugal, with vars. *azorica*, large-leaved, *myrtifolia*, dense form, and *variegata*, leaves margined silver.

Pseudocytisus—*Cruciferae*. Rather tender flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary light. Position, sheltered and rather dry border for *P. integrifolius*, sunny position in rock garden for *P. spinosus*. Plant, Oct. to Nov.

PROPAGATION: By cuttings of half-ripened wood in sandy soil under bell-glass in gentle bottom heat from June to Aug.

SPECIES CULTIVATED: *P. integrifolius* (syn. *Vella Pseudocytisus*), 'Cress Rocket', rather tender, yellow and purple, May to July, 1 to 2 ft., evergreen, Cent. Spain; *spinosus* (syn. *Vella spinosa*), yellow and brown, June, 1 ft., deciduous, spiny, Spain.

Pseudolarix (Golden Larch)—*Pinaceae*. Hardy deciduous coniferous tree. First introduced mid-nineteenth century.

CULTURE: Soil, gravel or stony. Position, as specimens in open places or on lawns. Plant in autumn.

PROPAGATION: By seeds sown 1 in. deep in beds in the open during March, transplanting seedlings when two years old.

SPECIES CULTIVATED: *P. amabilis* (syn. *P. Fortunei* and *Larix Kaempferi*), 100 to 130 ft., foliage turns rich yellow in autumn, China.

Pseudopanax—*Araliaceae*. Greenhouse evergreen shrubs or small trees. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts loam, peat or leaf-mould, charcoal and sand.

Pot, Feb. to March. Water freely March to Oct., moderately afterwards. Temp., March to Sept. 55° to 60°, Sept. to March 45° to 55°.

PROPAGATION: By cuttings of young shoots; inserting portions of roots in light soil in temp. 80° in April.

SPECIES CULTIVATED: *P. chathamicum*, 'Hoho', 20 ft., New Zealand; *crassifolium*, 5 to 10 ft., New Zealand, and vars. *Abelii*, *Baueri*, *Knightiifolium*, *trifolium*; *discolor*, 15 ft., New Zealand; *ferox*, green, 5 to 10 ft., New Zealand; *Lessonii* (syn. *Panax Lessonii*), 'Houmapara' or 'Houpara', to 15 ft., New Zealand.

Pseudosasa—*Gramineae*. Shrubs with creeping rootstocks. Formerly included in *Arundinaria* and *Sasa*.

CULTURE: Soil, good, not too heavy and of reasonable depth. Position, must be sheltered from cold winds and dry root conditions are disliked.

PROPAGATION: By division in April and May.

SPECIES CULTIVATED: *P. japonica* (syn. *Bambusa Metake*), 10 ft., hardy, finely toothed leaves, shining above, glaucous beneath, Japan.

Pseudotsuga (Douglas Fir)—*Pinaceae*. Hardy evergreen coniferous tree. First introduced early nineteenth century.

CULTURE: Good deep loam. Position, as specimens in open places or on lawns. Thrives in districts where there is an abundant rainfall.

PROPAGATION: By seeds sown 1 in. deep in beds in the open during March, transplanting seedlings when two years old.

SPECIES CULTIVATED: *P. taxifolia* (syn. *P. Douglasii*), 200 to 250 ft., Western N. America, and vars. *glauca*, 'Colorado Douglas Fir', leaves glaucous, *pendula*, branches pendulous, and *Fretsii*, leaves short and broad.

Psidium—*Myrtaceae*. Stove evergreen flowering shrubs. Fruit (berries), yellow or claret-coloured, round or pear-shaped, aromatic, edible. First introduced late seventeenth century.

CULTURE: Compost, two parts fibrous sandy loam, one part equal proportions dry cow manure and silver sand. Position, well-drained pots, tubs or beds with shoots trained to back walls of stove, warm greenhouse or vinery. Pot or plant, Feb. or March. Prune into shape annually, Feb. Water freely April to Oct., moderately afterwards. Syringe freely, March, until fruit begins to ripen, then keep foliage dry. Apply weak stimulants occasionally after berries form until fruit ripens. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 60°.

PROPAGATION: By cuttings of firm young shoots, 2 to 3 in. long, inserted in sand under bell-glass in temp. 75° to 80°, spring or summer.

SPECIES CULTIVATED: *P. Cattleianum*, 'Strawberry Guava', white, June, 15 to 25 ft., fruits purplish-red, obovate to globose, Brazil; *Guajava*, 'Common Guava', white, summer, 20 to 30 ft., fruits, yellow, globose, pyriform or ovoid, Trop. America.

Psoralea (Scurvy Pea)—*Leguminosae*. Greenhouse evergreen flowering scented shrubs. First introduced late seventeenth century.

CULTURE: Compost, equal parts fibrous loam, peat and silver sand. Position, pots in sunny, airy greenhouse. Pot, Feb. or March. Prune into shape, Feb. Water freely April to Sept., moderately afterwards. Good drainage essential. No stimulants or shade required. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By cuttings of firm shoots, 2 to 3 in. long, inserted in pots half filled with drainage, remainder layer of moss and pure sand, placed under bell-glass in shady part of greenhouse, May or June.

SPECIES CULTIVATED: *P. aculeata*, blue and white, summer, 3 ft., S. Africa; *aphylla*, blue and white, summer, 4 to 7 ft., S. Africa; *glandulosa*, white and blue, May to Sept., 4 ft., Chile; *pinnata*, blue, summer, 3 to 6 ft., S. Africa.

Psychotria (Wild Coffee)—*Rubiaceae*. Stove evergreen flowering shrub. Of similar habit to the *Ixora*. First introduced mid-nineteenth century.

CULTURE: Compost, two parts fibrous peat, one part fibrous loam, one part silver sand. Position, shady part of stove whilst growing; light one when at rest. Pot, Feb. or March. Prune into shape, Feb. Water freely March to Sept., moderately afterwards. Syringe morning and evening in spring and summer. Apply weak liquid manure once a week to healthy plants in flower. Temp., March to Sept. 75° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings in sandy peat under bell-glass in temp. of 75° to 85° in spring.

SPECIES CULTIVATED: *P. capensis*, yellow, spring, 3 to 4 ft., S. Africa; *jasminiflora* (syn. *Gloneria jasminiflora*), snow-white, summer, 3 ft., Brazil.

Ptelea—*Rutaceae*. Hardy deciduous flowering tree with elm-like fruits. First introduced early eighteenth century.

CULTURE: Soil, ordinary, well drained. Position, open shrubberies, plantations or woods. Plant, Nov. to Feb.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in sunny position outdoors in March or April; layering shoots in spring.

SPECIES CULTIVATED: *P. trifoliata*, 'Hop Tree', 'Wafer Ash', green, June to July, 15 to 20 ft., N. America, var. *aurea*, young leaves golden.

Pteretis (Ostrich Fern)—*Polypodiaceae*. Large hardy deciduous fern.

OUTDOOR CULTURE: Soil, two parts good loam, one part leaf-mould. Position, semi-shaded, cool, moist border or margin of pond. Plant, April.

POT CULTURE: Compost, two parts fibrous loam, one part leaf-mould, one part sand. Position, well-drained pots in shady, cold frame or greenhouse. Pot, March or April. Water copiously April to Sept., moderately Sept. to Nov., keep nearly dry Nov. to March. Repot annually.

PROPAGATION: By spores gathered just before the cases burst and sown on surface of well-drained pan of sandy peat and leaf-mould, cover with glass and keep moderately moist in a shady position in cold frame or greenhouse; division of plants March or April.

SPECIES CULTIVATED: *P. Struthiopteris* (syn. *Matteuccia Struthiopteris*), 3 to 5 ft., Europe.

Pteridium (Bracken)—*Polypodiaceae*. Hardy ferns useful as background in rock gardens, etc.

CULTURE: Soil, ordinary. Position, shady borders or woods. Plant, April.

PROPAGATION: By division; spores.

SPECIES CULTIVATED: *P. aquilinum* (syn. *Pteris aquilina*), fronds to 4 ft. long and 3 ft. wide, cosmopolitan, and vars. *languinosum* and *latiusculum*.

Pteris (Brake)—*Polypodiaceae*. Large genus of mostly tropical ferns. The hardy species formerly included here will be found under *Pteridium*.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand. Position, pots, beds or rockery in shady part of house. Pot, March or April. Water freely March to Oct., moderately other times. Temp., March to Sept. 55° to 65°, Sept. to March 50° to 55°.

PROPAGATION: By spores sown on fine sandy peat in well-drained pans in temp. 80° any time; dwarf species by division of plants, Oct. or April.

SPECIES CULTIVATED: *P. cretica*, fronds to 1 ft. long, Tropics and Subtropics, and numerous vars.; *ensifomis*, slender fertile fronds to 20 in., sterile fronds shorter, E. Asia, Malaya, Australia, var. *Victoriae*, segments banded with white; *serrulata* (syn. *P. multifida*), slender fronds to 1½ ft. long, China, Japan, there are many crested and other vars.; *tremula*, 'Australian Brake', fronds bright green to 3 ft. long, New Zealand, Australia.

Pteridophyllum—*Papaveraceae*. Hardy herbaceous rock garden plants.

CULTURE: Cool, well-drained loam. Position, north aspect or half-shade.

PROPAGATION: By division of old clumps when growth starts in spring.

SPECIES CULTIVATED: *P. racemosum*, white, July, 6 to 9 in., Japan.

Pterocarya (Wing Nut)—*Juglandaceae*. Hardy deciduous fast-growing trees resembling walnuts. Handsome, pinnate foliage. First introduced early nineteenth century.

CULTURE: Soil, deep loam. Position, as specimens in open places or on lawns. Require abundant moisture. Plant, Nov. to Feb. Young plants liable to damage by late spring frosts.

PROPAGATION: By seeds in open light soil during March; suckers in autumn.

SPECIES CULTIVATED: *P. fraxinifolia* (syn. *P. caucasica*), 50 to 100 ft., Caucasus; *hupeiensis*, 60 to 80 ft., W. China; *Rehderiana*, 40 ft., hybrid; *rhoifolia*, 'Japanese Wing Nut', 50 to 100 ft., Japan.

Pterocephalus—*Dipsacaceae*. Annual and perennial herbs. Sometimes included in *Scabiosa*.

CULTURE: As *Scabiosa*.

PROPAGATION: As *Scabiosa*.

SPECIES CULTIVATED: *P. parnassi* (syn. *Scabiosa pterocephala*), purplish-pink, July, in composite heads, spreading, deep-rooted.

Ptychosperma—*Palmae*. Stove palm with feather-shaped, green, very graceful leaves. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts loam and leaf-mould, half a part silver sand. Position, shady part of stove, warm greenhouse or conservatory; pots or tubs. Pot, Feb. or March. Water copiously March to Sept., moderately afterwards. Syringe freely daily March to Oct. Shade from sun. Top-dress large plants occasionally with layer of cow manure. Apply stimulants occasionally April to Sept. Temp., March to Oct. 60° to 75°, Oct. to March 55° to 60°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in light, rich soil in temp. 80° to 90°, Feb., March or April.

SPECIES CULTIVATED: *P. elegans*, 'Australian Feather Palm', 10 to 20 ft., Australia.

Pudding Pipe Tree, see *Cassia Fistula*.

Pulmonaria (Lung-wort)—*Boraginaceae*. Hardy herbaceous herbs. Ornamental foliage. Leaves, lance-shaped, green, sometimes spotted with white.

CULTURE: Soil, ordinary. Position, partially shaded rockeries or borders. Plant, Oct., Nov., March or April. Lift and replant in fresh soil every four or five years.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in ordinary soil in shady position outdoors, March or April; division of roots, Oct. or March.

SPECIES CULTIVATED: *P. affinis*, red and purple, spring, 1 ft., Europe; *angustifolia*, 'Blue Cowslip', blue and pink, spring, 1 ft., Europe, and vars. *arvernensis*, purple-blue, and *azurea*, blue; *montana* (syn. *P. rubra*), brick red, spring, 9 to 12 in., Transylvania; *officinalis*, red and violet, spring, 1 ft., Europe (Br.); *saccharata*, 'Bethlehem Sage', pink, April to July, 1 ft., Europe.

Pulsatilla, see *Anemone*.

Pultenaea—*Leguminosae*. Greenhouse evergreen flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, two parts fibrous peat, one part equal proportions silver sand and pounded charcoal. Position, light, airy greenhouse. Pot, Feb. or March. Well-drained pots and firm potting essential. Water freely April to Sept., moderately other times. Use soft water only. No stimulants required. Shade unnecessary. Stand plants in sunny position outdoors during July and Aug. Temp., Sept. to March 40° to 50°, March to July 55° to 65°.

PROPAGATION: By seeds sown on surface of shallow, well-drained pans filled with sandy peat, slightly covered with fine peat, placed under bell-glass in temp. 55° to 65°, March or April; cuttings of firm shoots, 2 to 3 in. long, inserted in sandy peat under bell-glass in shade in temp. 55° to 65° in summer.

SPECIES CULTIVATED: *P. daphnoides*, orange-red, June and July, 2 to 3 ft., Australia; *obcordata*, yellow, April, 3 ft., Australia; *retusa*, yellow and purple,

April, 1 ft., Australia; *rosea*, pink, spring, 1 ft., Australia; *stricta*, yellow, spring, 3 ft., Australia; *villosa*, yellow, spring, 3 ft., Australia.

Pummelo, see *Citrus maxima*.

Pumpkin, see *Cucurbita moschata*.

Punch-and-Judy Orchid, see *Gongora*.

Punica—*Punicaceae*. Slightly tender deciduous small tree, ornamental flowers, seldom producing fruit. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary, well drained. Position, full sun, warmest areas, sheltered position in open, elsewhere wall protection essential.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in well-drained pots in gentle heat, March; cuttings half-ripened wood, end July.

SPECIES CULTIVATED: *P. Granatum*, 'Pomegranate', reddish-scarlet, June to Sept., 15 to 25 ft., Persia and Afghanistan, and vars. *albescens*, white, *Legrellii*, double, striped red and yellow, and *nana*, dwarf, 3 to 4 ft., grown in greenhouses.

Purple Rock Cress, see *Aubrieta*; **-Wreath**, see *Petrea volubilis*.

Purslane, see *Portulaca*; **Rock-**, see *Calandrinia umbellata*.

Puschkinia (Striped Squill)—*Liliaceae*. Hardy bulbous flowering plants. First introduced early nineteenth century.

CULTURE: Soil, ordinary light, sandy. Position, sunny, well-drained border or rockery. Plant bulbs 4 in. deep, 1 in. apart, Oct. or Nov. Protect immediately after planting with covering 1 in. deep of coconut-fibre refuse or decayed manure. After flowering remove protective material, fully exposing surface to sun to ripen bulbs. Lift and replant every two or three years.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shallow, well-drained pans filled with light, sandy soil in Aug. or Sept., placed in cold frame; offsets, removed and planted as advised for old bulbs, Oct. or Nov.

SPECIES CULTIVATED: *P. scilloides*, white, striped with blue, spring, 4 in., Asia Minor, vars. *compacta*, dwarf, and *alba*, all white.

Pussy Paws, see *Spraguea multiceps*.

Putoria—*Rubiaceae*. Slightly tender dwarf shrubby plants.

CULTURE: Warm, deep, sandy loam and a sheltered, sunny position. A good plant for a warm wall.

PROPAGATION: By seeds; cuttings of ripened growths in late summer.

SPECIES CULTIVATED: *P. calabrica*, red, summer, 9 in., Medit. Regions.

Pycnostachys—*Labiatae*. Greenhouse perennial.

CULTURE: Soil, loam, leaf-mould and sand. Position, well-drained pots in sunny greenhouse. Water freely during the growing season, sparingly other times. Temp., Sept. to March 45° to 55°, March to Sept. 60° to 65°.

PROPAGATION: By cuttings in sandy peat in warm propagating frame; seeds in a temp. of 65° in spring.

SPECIES CULTIVATED: *P. Dawei*, blue, winter, 4 to 6 ft., Uganda; *urticifolia*, blue, winter, 3 ft., Trop. Africa.

Pygmy Sunflower, see *Actinea grandiflora*.

Pyracantha (Firethorn)—*Rosaceae*. Hardy and slightly tender evergreen flowering and berried shrubs. First introduced early seventeenth century.

CULTURE: Soil, ordinary, well drained. Position, full sun or partial shade. May be trained as wall climbers or as hedges, or will make spreading border specimens. Excellent for screening. Resent transplanting. Plant, Sept. to Oct. and April to May. Prune or trim where necessary in March.

PROPAGATION: By seeds in boxes of sandy soil in cool greenhouse or frame during Feb. or March; cuttings of nearly ripened young growth in sandy soil in frame during Aug. or Sept.

SPECIES CULTIVATED: *P. angustifolia*, white, May to June, 10 to 12 ft., orange-

yellow berries, requires some protection, W. China; *atalantioides* (syn. *P. discolor*), white, May to June, 10 to 20 ft., vigorous, hardy, scarlet berries, persisting, China; *coccinea* (syn. *Crataegus Pyracantha*), white, June, 10 to 15 ft., coral berries, S. Europe and Asia Minor, and its better known var. *Lalandii*, more vigorous, orange-red berries; *crenato-serrata*, white, May to June, berries coral-red, persisting, 10 to 15 ft., Cent. and W. China; *crenulata*, 'Nepalese White Thorn', white, May, 10 to 15 ft., requires wall protection, orange-yellow berries, Himalaya, and var. *Rogersiana*, superior to the type, hardy, glossy foliage, creamy white, May, fruits reddish-orange to yellow.

Pyrenean Meadow Saffron, see *Merendera*.

Pyrethrum, see *Chrysanthemum coccineum*.

Pyrola—*Ericaceae*. Hardy perennial herbs.

CULTURE: Soil, equal parts peat, leaf-mould and sandy loam. Position, moist, partially shady borders or rockeries. Plant, March or April. Water freely in dry weather. Lift, divide and replant only when overgrown.

PROPAGATION: By seeds sown thinly and slightly covered with very fine sandy peat in position where intended to grow, March or April; division of roots, April.

SPECIES CULTIVATED: *P. elliptica*, white, summer, 6 in., N. America; *media*, white, summer, 6 in., Siberia; *rotundifolia*, white, June, 6 to 9 in., Europe, and var. *incarnata*, pink, N. America.

Pyrostegia—*Bignoniaceae*. Greenhouse climbing plants. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part peat and silver sand. Pot, Feb. to April. Position, sunny greenhouse in well-drained border or bed, also large tubs. Prune away weak shoots and shorten by two-thirds strong shoots in February. Water freely March to Nov., slightly at other times. Temp., Oct. to Mar. 55° to 60°, March to Oct. 60° to 70°.

PROPAGATION: By cuttings of young shoots, 3 in. long, inserted in well-drained pots of sandy soil in temp. 65° to 70° in April.

SPECIES CULTIVATED: *P. ignea* (syn. *P. venusta*), orange-red, autumn, 20 ft. or more, Brazil.

Pyrrhocactus—*Cactaceae*. Greenhouse succulent plants, sometimes listed as *Echinocactus*.

CULTURE: As *Echinocactus*.

PROPAGATION: As *Echinocactus*.

SPECIES CULTIVATED: *P. centeterius*, yellowish-red, nearly globose, summer, Chile.

Pyrus (Pear)—*Rosaceae*. Hardy, deciduous, fruit-bearing and flowering trees, leaves usually turn red in autumn.

CULTURE OF PEARS: Soil, well drained and well supplied with humus to improve moisture-holding capacity. Position for cordon and horizontally-trained trees, south, west or east walls or fences. North walls for quick-ripening vars.; open sheltered garden for pyramids and bushes. Plant, autumn or spring. Cultural details, as advised for the apple (*Malus*). Potash is not so necessary for pears.

ROOTSTOCKS: Common pear for standards; quince for pyramids, bushes and cordons. *Malling Quince A*, good for dwarf trees and bushes, some incompatible vars. must be double-worked. *Malling Quince B* is similar to *A*. With *Malling Quince C* the mature tree is more dwarf than with other stocks.

CULTURE OF ORNAMENTAL SPECIES: Soil, ordinary. Position, sunny borders or shrubberies, or as specimens in open places. Plant, Nov. to Feb.

PROPAGATION: For new vars. by seeds stratified over winter and sown 3 in. deep outdoors in March; established vars. by grafting in March or budding in July and Aug.; layering in autumn.

FRUIT-BEARING SPECIES CULTIVATED: *P. communis*, 'Pear', white, April to May, to 40 ft., Europe and W. Asia, var. *sativa*, collective name for cultivated

vars., some of which are hybrids with *P. pyrifolia*, 'Sand Pear', 50 ft., hard, apple-shaped fruits, China and Japan.

ORNAMENTAL SPECIES CULTIVATED: *P. amygdaliformis*, 'Almond Pear', to 20 ft., flowers white, fruits yellowish, France to Asia Minor; *salicifolia*, 'Willow-leaved Pear', to 30 ft., flowers white, fruits yellowish, spring, 1 in., S.E. Europe, W. Asia.

Pyxidanthera—*Diapensiaceae*. Hardy evergreen creeping shrub. First introduced mid-nineteenth century.

CULTURE: Soil, equal parts sandy peat and leaf-mould. Position, sunny rockeries. Plant, Sept., Oct., March or April.

PROPAGATION: By seeds sown where required to grow, lightly covering with fine sandy peat, Sept., Oct. or March; division of plants, Oct. or March.

SPECIES CULTIVATED: *P. barbulate*, 'Flowering Moss', 'Pine Barren Beauty', white, rose, summer, 2 in., N. America.

Quaking Grass, see *Briza media*.

Quamash, see *Camassia Quamash*.

Quamoclit—*Convolvulaceae*. Stove greenhouse annual climber. Sometimes included in *Ipomaea*.

CULTURE: Compost, equal parts fibrous loam, leaf-mould, decayed manure and silver sand. Position, pots in warm greenhouse, with growths supported on twiggy stakes or trained to wires or trellis. Plant or pot, March or April. Temp., March to Sept. 65° to 70°. Water freely when established in final pots.

PROPAGATION: By seeds, $\frac{1}{8}$ in. deep, in pots in temp. 65° to 70° in March. Repot seedlings as required until they occupy 5 in. or 6 in. pots.

SPECIES CULTIVATED: *Q. lobata* (syn. *Mina lobata*), rosy crimson and yellow, summer, 6 to 8 ft., Mexico; *pennata* (syn. *Ipomaea Quamoclit*), 'Cypress Vine', red, summer, 6 ft., annual, Tropics.

Queen Lily, see *Phaedranassa*; **-of-the-Meadows**, see *Filipendula Ulmaria*; **-of-the-Prairie**, see *Filipendula lobata*; **-Palm**, see *Arecastrum Romanzoffianum*; **-Victoria Water Lily**, see *Victoria*.

Quercus (Oak)—*Fagaceae*. Hardy deciduous and evergreen trees and shrubs.

CULTURE: Soil, good deep loam, preferably rather moist. Position, shrubberies, fields and woods. *Q. Ilex* and *Q. Cerris* are suitable for planting near the sea. Plant evergreen kinds, Sept. to Nov. or April; deciduous ones, Sept., Oct., or April to end of May. Distance apart for deciduous oaks, 20 to 25 ft., evergreen species, used for shelter, 6 to 10 ft., for hedges, 4 to 6 ft. Prune deciduous oaks in Dec., evergreen kinds in April.

PROPAGATION: By acorns gathered in autumn, stored in sand until March and then sown 2 in. deep. Oaks transplant badly and are all the better for being sown where they are to grow. Choice kinds are grafted on common oak in March.

USEFUL DATA: Average extreme age of oak tree, 1,000 to 1,500 years, average spread of branches of largest trees, 180 ft. Flowers, greenish, male and female borne on same plant. Timber used for building, cabinet work, cartwheel spokes, fencing, etc., very durable. Weight of oak per cubic foot, 53 lb. One bushel of acorns will yield about 7,000 trees.

EVERGREEN SPECIES CULTIVATED: *Q. acuta*, 15 to 40 ft., Japan; *coccifera*, 10 to 12 ft., Medit. Region; *Ilex*, 'Holm Oak', 'Holly Oak', 60 ft., Medit. Region; *Suber*, 'Cork Oak', 50 to 60 ft., S. Europe, the source of the cork of commerce, only hardy in warmer districts.

DECIDUOUS SPECIES CULTIVATED: *Q. bicolor*, 'Swamp White Oak', 60 to 70 ft., Eastern N. America; *canariensis* (syn. *Q. Mirbeckii*), to 90 ft., one of the best oaks, handsome foliage retained till January, N. Africa and Portugal; *Cerris*, 'Turkey Oak', fast-growing, handsome tree, to 120 ft., S. Europe and Asia Minor; *coccinea*, 'Scarlet Oak', in true species leaves die off red and persist into winter, 60 to 80 ft., Eastern N. America, var. *splendens*, most handsome form;

Frainetto (syn. *Q. conferta*), good for chalk, large leaves warm-tinted in autumn, to 100 ft., S.E. Europe; *ilicifolia*, leaves white-felted beneath, 20 to 30 ft., Eastern U.S.; *imbricaria*, 'Shingle Oak', long narrow leaves, autumn tints, 50 to 60 ft., Cent. U.S.; *lyrata*, 'Overcup Oak', leaves to 12 in. long, 60 to 80 ft., N. America; *macranthera*, 60 ft., Caucasus and Persia; *macrocarpa*, enormous leaves, 40 to 50 ft., Eastern N. America; *marilandica*, 'Black Jack Oak', slow growing, autumn tints, 30 to 40 ft., Eastern U.S.; *Muhlenbergii* (syn. *Q. castanea*), 'Chestnut Oak', handsome, uncommon, 60 to 100 ft., Caucasus and Persia; *palustris*, 'Pin Oak', quick growing, reliable, autumn tints, 75 to 100 ft., Eastern U.S.; *petraea* (syn. *Q. sessiliflora*), 'Durmast Oak', British native species, generally found in elevated districts, 60 to 120 ft., Europe; *pontica*, large-ribbed leaves, to 20 ft., Armenia and Caucasus; *Robur* (syn. *Q. pedunculata*), 'Common Oak', to 100 ft., sometimes more, Britain, Europe and Asia Minor, many vars. including *Concordia*, 'Golden Oak', *fastigiata*, columnar habit, *heterophylla*, leaves variously shaped, *pendula*, weeping, *purpurascens*, leaves and young shoots tinged purple, *variegata*, leaves marked with white or yellow; *velutina*, 'Black Oak', bark permeated yellow, used for tanning, 70 to 100 ft., Eastern and Cent. U.S.

Quick, see *Crataegus monogyna*.

Quillwort, see *Isoetes*.

Quince, see *Cydonia* and *Chaenomeles*.

Quinine, see *Chinchona*.

Quinoa, see *Chenopodium Quinoa*.

Quisqualis—*Combretaceae*. Stove climbing flowering deciduous shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part peat and a little sand. Position, well-drained pot or tub, or in a bed with shoots trained up rafters. Pot, Feb. Prune shoots moderately closely after flowering. Water freely April to Oct., keep nearly dry remainder of year. Syringe daily April to Sept. Shade from midday sun only.

PROPAGATION: By cuttings of young shoots taken off with a small portion of old stem attached and inserted in sandy soil in small pots under a bell-glass in a temp. of 75° to 85° in spring.

SPECIES CULTIVATED: *Q. indica*, 'Rangoon Creeper', white, changing to red, fragrant, summer, 10 to 15 ft., India.

Radish, see *Raphanus sativus*.

Raffenaldia—*Cruciferae*. Dwarf alpine perennial, sometimes known as *Cossonia*.

CULTURE: Very sandy soil in full sun.

PROPAGATION: By seeds sown in soil as above.

SPECIES CULTIVATED: *R. primuloides* (syn. *Cossonia africana*), yellow, summer, N. Africa.

Ragged Robin, see *Lychnis Flos-cuculi*.

Ragwort, see *Senecio*.

Ramonda—*Gesneriaceae*. Hardy perennial plants, sometimes spelled *Ramondia*. First introduced early eighteenth century.

CULTURE: Soil, light sandy peat, ample humus. Position, north or semi-shaded aspect in vertical or horizontal crevices, not on the flat. Water in very dry weather. For pot culture use similar soil and grow in cool position or in shaded cold greenhouse or frame.

PROPAGATION: By seeds sown in similar compost (germination and subsequent growth is hastened by slight heat where possible); by division of plants or by leaf cuttings made in summer.

SPECIES CULTIVATED: *R. Heldreichii* (syn. *Jankaea Heldreichii*), lavender, early summer, 3 in., Greece, and var. *alba*; *Myconi* 'Rosette Mullein', deep lavender,

early summer, 4 in., Pyrenees, and vars. *alba*, white, *rosea*, pink; *Nathaliae*, rich lavender, June, 4 to 6 in., Macedonia, *serbica*, lavender, June, 4 in., Balkans, and var. *alba*.

Rampion, see *Campanula Rapunculus*.

Ramsons, see *Allium ursinum*.

Randia—*Rubiaceae*. Stove evergreen flowering climbing shrubs. First introduced early eighteenth century.

CULTURE: Compost, one part loam, one part peat, one part well-decayed manure and charcoal. Position, well-drained pots or beds in plant stove. Pot or plant, Feb. or March. Prune into shape, Feb. or March. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 65°. Water moderately Oct. to Feb., freely afterwards. Syringe daily (except when in bloom) March to Sept. Apply liquid manure occasionally to healthy plants in flower. Plants one to two years old produce the best blooms.

PROPAGATION: By cuttings of firm young side shoots, 2 to 3 in. long, inserted in well-drained pots of sandy peat under bell-glass in temp. 75° to 85°, Jan. to April.

SPECIES CULTIVATED: *R. dumetorum*, yellowish-white, July, 5 ft., Trop. Asia; *macrantha*, yellow, summer, 20 to 30 ft., Trop. Africa; *maculata*, white, April, 10 to 15 ft., Trop. Africa; *malleifera*, white, July, 4 to 6 ft., Trop. Africa.

Rangoon Creeper, see *Quisqualis indica*.

Ranunculus (Buttercup; Crowfoot)—*Ranunculaceae*. Hardy and half-hardy, herbaceous, tuberous-rooted and aquatic perennials.

CULTURE OF TUBEROUS-ROOTED SPECIES (Turban, Persian, Dutch and Scotch Ranunculus): Soil, two parts good sandy loam and one part decayed cow manure for fine blooms; good ordinary soil enriched with rotted manure and leaf-mould for general culture. Position, open, sunny beds or borders. Plant Turban, Scotch and Dutch vars. in Oct. or Nov., in warm, sheltered districts, end of Feb. otherwise; Persian kinds, end of Feb. Place tubers claw-side downwards 2 in. deep and 3 in. apart if to be grown in beds; 2 in. deep and 4 in. apart in rows 5 in. asunder if to be grown in lines in border. Press tubers firmly in soil and cover with fine soil. Protect autumn-planted tubers with mulch of manure or leaves. Mulch in April with rotted manure or peat. Water copiously in dry weather. Sprinkle Peruvian guano on the bed at the rate of 1 oz. per square yard when leaves appear. Apply liquid manures— $\frac{1}{4}$ oz. each of nitrate of soda, superphosphate, and sulphate of iron to 2 gall. of water—once a week from time leaves appear until flower buds open. Lift tubers when flowers fade and leaves turn yellow—generally early in July—dry them in the sun, and store away in sand in cool place till planting time.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, shady or partially shady border. Plant, Oct., Nov., March or April. Lift, divide and replant in fresh soil triennially. Mulch annually in March with decayed manure.

PROPAGATION: By seeds sown as soon as ripe in autumn $\frac{1}{8}$ in. deep in boxes or pans filled with equal parts loam, leaf-mould and sand and placed in a cold frame or cool greenhouse; herbaceous kinds by division in Oct. or March.

TUBEROUS-ROOTED SPECIES CULTIVATED: *R. asiaticus*, 'Turban', 'Persian', 'French', Dutch' and 'Scotch Ranunculus', various colours, summer, 6 to 12 in., Orient.

HARDY SPECIES CULTIVATED: *R. aconitifolius*, 'Fair Maids of Kent', white, May, 1½ to 2 ft., Europe, var. *flore-pleno*, 'Fair Maids of France', 'Bachelor's Buttons'; *acris*, yellow, spring, 1 to 2 ft., Europe (Br.), var. *flore-pleno*, double; *alpestris*, white, summer, 4 in., Europe; *amplexicaulis*, white, May, 6 to 12 in. S. Europe; *bulbosus*, yellow, spring, 1 ft., Europe (Br.), var. *flore-pleno*, double; *bullatus*, orange-yellow, May, 1 ft., rather tender, Medit. Region; *Callianthemum*, white, 3 in., Europe and Siberia; *crenatus*, white, April to July, Transylvania; *genariifolius*, yellow, May to June, 3 to 4 in., Europe; *glacialis*, white and rose, summer, 6 in., Arctic Regions; *gramineus*, yellow, spring, 6 to 8 in., Europe;

Lingua, 'Spearwort', yellow, summer, 3 to 4 ft., Europe (Br.); *Lyallii*, 'New Zealand Mountain Buttercup', white, spring, 2 to 3 ft., New Zealand; *monspeliacus*, yellow, spring, 1 ft., Medit. Region; *parnassifolius*, white, June, 6 in., Europe; *pyrenaeus*, white, summer, 6 in., S. Europe; *Seguieri*, white or rose-tinted, May to July, 4 in., Europe; *Thora* (syn. *R. carpaticus*), yellow, May to July, 6 in., S. Europe.

Ranzania—*Berberidaceae*. Hardy herbaceous perennials.

CULTURE: Woodland soil and half-shady aspect or north exposure.

PROPAGATION: By seeds sown in spring or by division of old plants in spring.

SPECIES CULTIVATED: *R. japonica*, lilac, April to May, 12 in., Japan.

Raoulia—*Compositae*. Small tufted or creeping perennial herbs.

CULTURE: Soil, sandy or gritty loam. Position, ledges of sunny rockeries or surface of moraine, suitable for carpeting the soil on rockeries; *R. eximia* and *R. grandiflora* in the Alpine House. Plant in spring.

PROPAGATION: By division in March; seeds.

SPECIES CULTIVATED: *R. australis*, silvery foliage, New Zealand; *eximia*, silver rosettes, New Zealand; *glabra*, emerald green foliage, New Zealand; *grandiflora*, silver foliage, New Zealand; *subsericea*, silvery foliage, very minute, New Zealand.

Rape, see *Brassica Napus*.

Raphanus—*Cruciferae*. Annual, biennial and perennial herbs, including the radish. First introduced mid-sixteenth century.

OUTDOOR CULTURE OF COMMON RADISH: Soil, any well-cultivated ground in good heart. Position, warm south border for first and last sowing; cool, partially shady ones for intermediate crops. Sow for first crop in Feb., either broadcast or in drills 6 in. apart; successional crops in similar manner at intervals of a fortnight until end of May. Make summer sowings in cool moist site or the plants will run to seed, but in suitable position sow each fortnight up to Oct. Long-rooted kinds best for spring sowing, round and oval ones for summer. Forcing: Make a hotbed of manure, cover with 4 in. of fine mould and place a frame over it. Sow seeds thinly, lightly cover with mould, moisten with tepid water and keep close until seedlings appear, then admit air daily. Thin early to ensure good roots. First sowing should be made in Dec., second in Jan., third in Feb. and fourth in March. Long-rooted vars. best for forcing. Seeds germinate in three to five days. Crop reaches maturity in five to six weeks.

CULTURE OF CHINESE RADISH: Sow seeds in drills 1 in. deep and 6 in. apart in July or Aug. Thin seedlings when 1 in. high to 6 in. apart. Water freely in dry weather. Lift roots in Nov. and store in sand in a cool shed to use as required.

CULTURE OF RAT-TAILED RADISH: Sow seeds in drills 1 in. deep and 6 in. apart in April, May or June. Thin to 6 in. apart when 1 in. high. Gather long seed pods when grown for pickling, mixing with salads, or cooking and eating, like asparagus.

SPECIES CULTIVATED: *R. sativus*, 'Common Radish', white, purple, May, roots long, round or oval, crimson and white, Europe and Asia, var. *caudatus*, 'Rat-tail Radish', roots not tuberous, pods 8 to 12 in. long, thick, used in pickles, *longipinnatus*, 'Chinese Radish', roots long and durable, much grown in the Orient.

Raphiolepis—*Rosaceae*. Slightly tender and hardy evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Soil, ordinary, well drained. Position, south and south-west walls or well-drained borders for tender species; sunny rockeries or sheltered borders for hardy species. Plant, Sept., Oct. or April. Prune straggling shoots into shape, April. Protect tender species in severe weather with mats or straw hurdles.

POT CULTURE OF TENDER SPECIES: Compost, equal parts peat, loam and coarse sand. Position, well-drained pots in cold greenhouse or pit, Sept. to May; sunny place outdoors, May to Sept. Pot, Feb. or March. Water copiously April to Oct., moderately afterwards.

PROPAGATION: By cuttings of firm shoots, 2 to 3 in. long, in compost of equal parts sand, peat and loam under bell-glass or hand-light in cold frame, Aug.

SPECIES CULTIVATED: *R. Delacouri*, tender, pink, May, 5 ft., hybrid; *indica*, 'Indian Hawthorn', tender, white, tinged pink, summer, 4 to 8 ft., China; *umbellata* (syn. *R. japonica*), hardy, withstands wind, white, fragrant, June, 10 ft., Japan.

Raspberry, see *Rubus idaeus*; **Strawberry**-, see *Rubus illecebrosus*.

Rattan Palm, see *Calamus*.

Rattlesnake Fern, see *Botrychium virginianum*; **-Plantain**, see *Goodyera*.

Ravenala—*Musaceae*. Stove evergreen perennials with palm-like trunks and very large leaves.

CULTURE: Compost, two parts good loam, one part well-decayed manure and one part sand. Position, pots, tubs or beds in lofty sunny stove. Pot or plant, Jan. to April. Water copiously Feb. to Oct., about once fortnightly afterwards. Syringe twice daily Feb. to Sept., once daily Sept. to Feb. Moist atmosphere essential. Apply stimulants twice or three times weekly March to Oct. Temp., March to Oct. 70° to 85°, Oct. to March 60° to 70°.

PROPAGATION: By suckers removed from parent plant and placed in pots in temp. 75° to 85° any time of year.

SPECIES CULTIVATED: *R. guianensis*, white, 15 ft., S. America; *madagascariensis*, 'Traveller's Tree', 15 to 30 ft., Madagascar.

Ravenea—*Palmae*. Stove palm with feather-shaped, green leaves. First introduced late nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, shady, moist. Pot, Feb. or March. Water abundantly March to Oct., moderately afterwards. Temp., March to Sept. 70° to 85°, Sept. to March 60° to 65°.

PROPAGATION: By seeds sown 1 in. deep in pots of light soil in temp. 85° in March.

SPECIES CULTIVATED: *R. Hildebrandtii*, 5 to 10 ft., Comoro Islands.

Ravenna Grass, see *Erianthus Ravenna*.

Redbird Cactus, see *Pedilanthus tithymaloides*.

Red-bud, see *Cercis*; **-Chamomile**, see *Adonis annua*; **-Chokeberry**, see *Aronia arbutifolia*; **-Fir**, see *Abies magnifica*; **-hot Cat-tail**, see *Acalypha hispida*; **-hot-poker**, see *Kniphofia*; **-ink Plant**, see *Phytolacca americana*; **-Sandalwood Tree**, see *Adenanthera pavonina*; **-Valerian**, see *Centranthus ruber*; **-wood**, see *Sequoia sempervirens*.

Reed Mace, see *Typha latifolia*.

Rehmannia—*Scrophulariaceae*. Half-hardy perennial herb. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, moist, sandy loam and peat. Position, partially shady borders, or at base of walls running east and west. Plant, March or April. Water freely in dry weather. Mulch liberally with leaf-mould or decayed manure in April. In cold districts it is best to lift plants in Oct., place in pots and store in cold frame or pit until following March, then plant out.

POT CULTURE: Compost, two parts sandy loam, one part peat, one part leaf-mould. Position, well-drained pots in cold frame, pit or greenhouse. Pot, Feb. or March. Water liberally April to Oct., moderately afterwards. Apply weak stimulants once a week during flowering period. Shade from bright sun essential.

PROPAGATION: By seeds sown in well-drained pans in warm greenhouse during Feb., or division in autumn.

SPECIES CULTIVATED: *R. angulata*, red and orange, 1 to 3 ft., China, var. *alba*, white, 1 to 3 ft.; *glutinosa* (syn. *R. chinensis*), purple, April, 1 to 2 ft., China and Japan.

Reineckia—*Liliaceae*. Hardy herbaceous perennial with creeping underground stems. First introduced late eighteenth century.

CULTURE: Soil, ordinary good. Position, sunny rockeries or borders; variegated var. as edgings to borders. Plant, March or April. Lift, divide and replant every three or four years. Water copiously in dry weather.

PROPAGATION: By division of creeping rhizomes in March or April.

SPECIES CULTIVATED: *R. carnea*, pink, fragrant, April, 6 in., China and Japan, var. *variegata*, variegated.

Reinwardtia—*Linaceae*. Greenhouse evergreen flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam and peat, little sand. Pot, March or April. Prune previous year's shoots to within 1 in. of their base in Feb. or March. Position, warm greenhouse Sept. to June; cold, sunny frame June to Sept. Water moderately Oct. to March, freely other times. Syringe twice daily Feb. to Sept. Apply weak stimulants occasionally when in flower. Temp., Sept. to Feb. 55° to 65°, Feb. to June 65° to 70°. Nip off points of young shoots in June to induce bushy growth.

PROPAGATION: By cuttings of shoots, 2 to 3 in. long, inserted in sandy soil under bell-glass in temp. 65° to 75° in April or May.

SPECIES CULTIVATED: *R. indica* (syn. *Linum trigynum*), 'Winter Flax', yellow, autumn, 2 to 4 ft.; *tetragyna*, yellow, winter, 3 ft. Both natives of India.

Renanthera—*Orchidaceae*. An epiphytic genus. Few species, all with numerous showy flowers. Scapes usually branched. Flowers with narrow upper sepal and petals, and much broader lower sepals, lip small. Habit near to that of *Vanda*.

CULTURE: Compost, temps., etc., as for the warm-growing *Vandas*. The syringe may be freely used in summer. Winter watering should be slightly more infrequent than with *Vandas* as the leaves are of harder texture.

PROPAGATION: As for *Vandas*, the stem severance being always made below stem roots.

SPECIES CULTIVATED: *R. annamensis*, small, orange-yellow and crimson, early summer, Annam; *coccinea*, vermilion-red with a little yellow, stem will reach a great length, summer, various, Burma, Cochin-China; *elongata*, small, many, yellow with suffusions of purple-red, autumn, Java, Sumatra; *Imshootiana*, many, upper segments yellow and vermilion, lower, vermilion, lip deeper in colour, spring, summer, 1 to 3 ft., Burma, Assam; *matutina*, orange-yellow, spotted scarlet-crimson, mid-lobe or lip hooked, autumn, winter, Java, Philippines; *pulchella*, yellow and crimson, summer, Burma; *Storiei*, stem up to 12 ft., many, large, upper segments orange-yellow to red, lower, dark crimson with lighter tints, lip crimson, yellow, whitish, summer, autumn, Philippines.

Reseda—*Resedaceae*. A perennial, but usually grown as an annual. First introduced mid-eighteenth century.

OUTDOOR CULTURE: Soil, ordinary, containing old mortar or slaked lime. Position, sunny beds, borders or rockeries. Sow seeds $\frac{1}{8}$ in. deep in masses or rows in March or April. Thin seedlings when 1 in. high to 3 in. apart. Water freely in summer. Apply stimulants occasionally when in flower. In warm, dry positions plants will survive the winter outdoors for several years.

INDOOR CULTURE: Compost, any good potting soil containing lime. Sow March or April for summer flowering, July or Aug. for winter and spring. Fill 3 in. pots to within $\frac{1}{4}$ in. of rim, sow five or six seeds in each, cover with $\frac{1}{16}$ in. of soil, and place in temp. 55°. When seedlings are 1 to 2 in. high transfer bodily to flowering pots (5 in.). Pot firmly and disturb roots as little as possible. Water moderately at first, freely afterwards. Pinch off points of main shoots when 3 in. high if abundance of bloom is required. Apply dilute farmyard manure water or fertiliser once a week in the growing season.

SPECIES CULTIVATED: *R. odorata*, 'Mignonette', yellow and white, summer, 1 to 2 ft., N. Africa and Egypt.

Rest Harrow, see *Ononis*.

Restrepia—*Orchidaceae*. An epiphytic genus. One section (not in cultivation) has a branching creeping rhizome. A second section is of tufted habit much as in *Pleurothallis*, the stems bearing a solitary, usually heart-shaped, leaf. Flowers solitary, the upper sepal and petals narrow, often with a 'knob' at their apices. The lower sepals are much larger, joined, except at their tips, the smaller lip lying on them. The flowers of some are brightly marked, in all freely produced.

CULTURE: Compost and general conditions as for *Pleurothallis*.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: A selection—*R. antennifera*, yellowish-red marked, lower sepals each with seven purplish-red stripes, spring, summer, Colombia; *elegans*, small, whitish, purple streaked, lower sepals yellowish, purple spotted, spring, summer, Venezuela; *maculata*, comparatively large, yellow, red dotted, lower sepals yellow spotted with brown-purple, summer, Colombia; *pandurata*, whitish, spotted crimson-purple, various, Colombia; *striata*, maroon, lower sepals yellow, each with seven maroon stripes, various, Colombia; *trichoglotta*, whitish and purple, lower sepals cream, spotted crimson-purple, lip haired, summer, Colombia.

Resurrection Plant, see *Anastatica hierochuntica* and *Selaginella lepidophylla*.

Retinospora—Juvenile stages of *Chamaecyparis* and *Thuja*, not recognised as a genus.

Rhabdothamnus—*Gesneriaceae*. Dwarf slender greenhouse shrub. A monotypic genus from New Zealand.

CULTURE: Compost, equal parts sandy loam, peat and leaf-mould. Position, well-drained pots in shady part of greenhouse or frame. Water carefully Sept. to March, moderately at other times. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

PROPAGATION: By seeds sown in sandy peat in temp. of 65° during spring; cuttings of young side shoots inserted in sandy peat under bell-glass or in propagating frame, temp. 60° to 65°.

SPECIES CULTIVATED: *R. Solandri*, orange, striped brownish-red, winter, 1 to 3 ft.

Rhamnus (Buckthorn)—*Rhamnaceae*. Hardy evergreen and deciduous trees and shrubs.

CULTURE: Soil, ordinary. Position, sunny or shady shrubberies; good seaside shrubs. Plant, Oct. to March. Prune, Feb.

PROPAGATION: By seeds sown outdoors in autumn; cuttings inserted outdoors in ordinary soil in Sept.; by layering in Sept. or March.

SPECIES CULTIVATED: *R. Alaternus*, 10 to 20 ft., evergreen, S.W. Europe, and vars. *angustifolia* and *argenteo-variegata*, leaves margined with creamy white, useful and attractive maritime shrub; *californica*, 10 to 15 ft., evergreen, Western N. America; *cathartica*, 'Buckthorn', 5 to 10 ft., deciduous, Europe (Br.); *Frangula*, 15 to 20 ft., deciduous, Europe (Br.); *imeretina* (sometimes wrongly called *R. libanotica*), 10 ft., deciduous, fine autumn colour, Western Caucasus; *pumila*, 6 in., deciduous, Alps; *Purshiana*, 'Cascara Buckthorn', drug obtained from bark, 40 to 50 ft., Western N. America.

Rhapis—*Palmae*. Greenhouse, fan-shaped palms. First introduced mid-eighteenth century.

CULTURE: Compost, two parts rich loam, one part decayed leaf-mould and sand. Position, well-drained pots in greenhouse or dwelling-room during summer. Pot, Feb. or March. Water copiously April to Oct., moderately afterwards. Apply weak stimulants occasionally during summer. Place small lumps of sulphate of iron on surface of soil to ensure deep healthy green foliage. Shade from sun essential. Syringe twice daily in summer, once other times. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

PROPAGATION: By seeds sown 1 in. deep in light soil in temp. of 80° in Feb. or March; suckers removed in April or Aug.

SPECIES CULTIVATED: *R. excelsa* (syn. *R. flabelliformis*), 3 to 4 ft., China and Japan; *humilis*, 3 ft., China.

Rhazya—*Apocynaceae*. Hardy sub-shrub. First introduced late nineteenth century.

CULTURE: Soil, sandy loam. Position, sunny well-drained slopes or rock gardens. Plant, March to April.

PROPAGATION: By seeds sown in pans in greenhouse during Feb. or March.

SPECIES CULTIVATED: *R. orientalis*, blue, late summer, 9 to 12 in., Levant.

Rheum (Rhubarb)—*Polygonaceae*. Hardy herbaceous perennials. Ornamental foliage plants, one species cultivated for edible stalks. First introduced mid-sixteenth century.

CULTURE OF EDIBLE RHUBARB: Soil, light, deep, rich. Position, sunny, open. Plant single roots firmly with crowns at surface level, 3 ft. apart in rows 3 ft. asunder, in Nov., Feb. or March. Top-dress with manure in Nov. or Feb., forking it into surface of soil. Lift, divide and replant every four years. No stalks should be gathered the first year. Discontinue pulling after July. Remove flower stems directly they appear. **Forcing Roots:** Two- to five- year-old plants best for forcing. Cover crowns with pots, boxes or tubs, and place fresh manure and tree leaves over these in Jan. or Feb., or lift strong roots exposed to frost and then place close together in deep boxes underneath staging in warm greenhouse, in corners of dark cellars, or in mushroom houses, with a little soil between. Keep moist and dark. Temp., 55° to 75°. Water moderately at first, but freely as growth commences. Forcing season, Nov. to Feb. Reject roots after forcing.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in ordinary soil outdoors in March or April; by division of roots with crowns or buds attached, Nov. to Feb.

CULTURE OF ORNAMENTAL-LEAVED SPECIES: Soil, deep, rich, ordinary. Position, isolated specimens on lawns, wild gardens, islands; sunny. Plant, Nov. to Feb. Water copiously in dry seasons. Apply stimulants occasionally in summer.

SPECIES CULTIVATED: *R. acuminatum*, 3 ft., Himalaya; *Collinianum*, 6 ft., China; *emodi*, 6 to 10 ft., Himalaya; *officinale*, 'Medicinal Rhubarb', 8 to 10 ft., Tibet; *palmatum*, 5 to 6 ft., N.E. Asia, and var. *tanguticum*; *Rhaponticum*, 'Edible Rhubarb', to 6 ft., Siberia; *Ribes*, showy, blood-red fruits, 5 ft., Asia Minor to Persia.

Rhexia—*Melastomaceae*. Hardy perennial herb. First introduced mid-eighteenth century.

CULTURE: Soil, sandy peat or bog. Position, open, sunny bog, swamp, or moist border. Plant, Oct., Nov., March or April. The plants should not be disturbed too frequently and are often only hardy in sheltered positions.

PROPAGATION: By division of roots in March or April; seed sown in sandy soil in pans.

SPECIES CULTIVATED: *R. virginica*, 'Deer Grass', 'Meadow Beauty', purple, summer, 6 to 12 in., N. America.

Rhipsalis—*Cactaceae*. Greenhouse succulent shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts sandy loam, leaf-mould, brick rubbish and coarse silver sand. Position, well-drained pots in light greenhouse. Pot, April or May; pots to be drained one-sixth depth for large plants, one-third for small plants. Press compost in firmly. Water moderately April to Aug., keep almost dry Aug. to April. Shade from bright sunshine. Temp., March to Sept. 55° to 65°, Sept. to March 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in well-drained sandy soil and placed in temp. 75°, March; keep soil moderately moist. By cuttings of stems inserted in small pots of sandy soil in summer; grafting on *Cereus speciosissimus*.

SPECIES CULTIVATED: *R. cassutha*, yellow, Sept., 1 ft., W. Indies; *cereuscula*

(syn. *R. Saglionis*), 'Mistletoe Cactus', yellow, March, 1 ft., Buenos Ayres; *crispata*, white, Dec., 1 ft., Brazil; *grandiflora* (syn. *R. funalis*), white, Feb., 3 ft., S. America; *Houlletiana*, yellow, winter, Brazil; *mesembryanthoides*, white, spring, 6 in., S. America; *pachyptera*, white, Feb., Trop. America; *prismatica* (syn. *Pseudorhipalis alata*), white, June, W. Indies; *sarmentacea*, white, spring, Argentina.

Rhodanthe, see *Helipterum Manglesii*.

Rhodochiton—*Scrophulariaceae*. Greenhouse climbing herb. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam and leaf-mould and half a part silver sand. Position, well-drained pots, boxes, beds or borders, with shoots trained up trellis, walls or rafters of sunny greenhouse. Pot, March to May. Water freely March to Sept., moderately Sept. to March. Apply stimulants during flowering period. Shade from bright sun. Thin out and shorten shoots moderately in Feb. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in ordinary light soil in temp. 50° to 60°, March, transplanting seedlings when 1 in. high singly in 2 or 3 in. pots; cuttings of shoots inserted in sandy soil under bell-glass in temp. 45°, March to Aug.

SPECIES CULTIVATED: *R. atrosanguineum* (syn. *R. volubile*), 'Purple Bellerine', reddish-purple, summer, 10 to 15 ft., Mexico.

Rhododendron—*Ericaceae*. Greenhouse and hardy evergreen and deciduous shrubs, including Azalea. *R. ponticum*, parent of hardy kinds, first introduced mid-eighteenth century; *R. Simsii* (Indian Azalea), early nineteenth century.

HARDY HYBRID RHODODENDRONS: In the main the hybrid garden races of evergreen rhododendrons have sprung from such species as *RR. catawbiense*, *ponticum*, *caucasicum*, *arboreum* and *Griersonianum*. A lesser part has been played by *R. maximum*, *Griffithianum*, *Fortunei*, *Thomsonii*, *Williamsianum*, *dicroanthum*, *haematodes*, *eriogynum*, *repens*, *neriiflorum*, *Elliotii*, *cinnabarinum*, *discolor* and *campylocarpum*. The deciduous hybrid azaleas have been obtained from *R. flavum*, *calendulaceum*, *nudiflorum*, *viscosum*, *occidentale*, *molle* and others. The Ghent azaleas are, in the main, derived from *R. flavum*, *viscosum*, *nudiflorum*, *calendulaceum* and *luteum*. The dwarf Japanese azaleas, such as Hinodgeri, are closely allied to *R. obtusum*, those known as 'Kurume Azaleas' being forms raised over a period of many years by Japanese horticulturists round the city of Kurume, in the southern island of Kyushu, Japan. The greenhouse azaleas are, in the main, hybrids of *R. Simsii*.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts turfy peat, one part silver sand. Position, well-drained pots or tubs, indoors all the year for stove species, greenhouse species may be stood outdoors on bed of cinders in sunny position from June to Sept. Pot, April or May, directly after flowering. Water freely April to Oct., moderately afterwards, preferably rain-water; water containing lime is injurious. A little artificial fertiliser may be applied to surface of soil when flower buds show. Repotting only necessary every three or four years. Temp. stove species, 55° to 65° Sept. to March, 70° to 80° March to Sept.; greenhouse species, 45° to 55° Sept. to March, 55° to 65° March to Sept.

CULTURE OF HARDY SPECIES: It is impossible to cover fully, in a confined space, the immense variety of species and hybrids and their individual requirements. The species vary from low-creeping shrubs to large trees, and natural conditions in which they are found vary from shaded and sheltered woodland to elevated dry and exposed moorland. For full details refer to *Rhododendron Year Books* and *Rhododendron Handbook* published by the Royal Horticultural Society. Only one species, *R. hirsutum*, will grow in soil containing free lime. General Cultivation: Lime-free soil essential; the majority like cool, moist and humus-rich soil, and both heavy and light soils should receive heavy dressings well dug in prior to planting. Hungry light soils should have some well-decayed manure mixed in also. All rhododendrons benefit from annual top-dressing; useful material consists of compost, half-decayed leaves or bracken. Best garden value for ordinary conditions found amongst the numerous named garden hybrids, which are easily grown. Position, in clumps or drifts in open border or semi-woodland glades.

Some species equally easy but others require specialised positions. Always remove developing seed pods at fading of flowers.

CULTURE OF INDIAN AZALEA: Compost, three parts peat, one part loam and one part equal proportions of leaf-mould and silver sand. Position, well-drained pots in sunny greenhouse from Oct. to June, in partial shade outdoors, June to Sept. Repot directly after flowering, firm potting essential. Prune only to shorten straggly growth. Syringe daily after flowering till plants are taken outdoors. Water moderately Oct. to March, freely afterwards, never allowing roots to get dry. Apply weak liquid manure when flower buds form. Temp., Oct. to March 45° to 55°, March to June 65°. Remove seed pods directly they form.

PROPAGATION: By seeds sown on surface of sandy peat from mid-Jan. to mid-Feb., slightly covered with fine sand and placed under bell-glass in temp. 55° to 60°, kept moderately moist; cuttings of firm shoots, 3 in. long, with a heel, taken from the end of June to Nov., inserted in three parts sand, one part granulated peat under bell-glass in temp. 45° to 55° at first, then 10° higher, steady bottom heat aids rooting of large-leaved kinds; small-leaved kinds can be rooted without heat; take cuttings of large-leaved kinds first and continue to smallest-leaved vars. last; layering in spring or summer; grafting on common species in a close frame or propagator in March. The hardiness of the different species is indicated by a letter following the specific name, as follows:

- A. Hardy anywhere in the British Isles and may be planted in full exposure if desired.
- B. Hardy anywhere in the British Isles but requires some shade to obtain the best results.
- C. Hardy along the seaboard and in warm gardens inland.
- D. Hardy in south and west but requires shelter even in warm gardens inland.
- E. Requires shelter in most favoured gardens.
- F. Usually a greenhouse shrub.
- P. Early flowering.

From B to E inclusive, planting in open spaces in woodland usually gives the best results.

SPECIES CULTIVATED: *R. ambiguum*, A, yellow, April to May, to 5 ft., W. China; *arboreum*, D, red, Jan. to April, 30 to 40 ft., Himalaya; *argyrophyllum*, A, white, May, to 20 ft., S.W. China; *Augustinii*, C, blue, early May, 10 ft., China; *auriculatum*, B, white, fragrant, July to Aug., 15 ft., China; *barbatum*, B, scarlet, March, 30 to 60 ft., Himalaya; *bullatum*, D, white, fragrant, April to May, 8 ft., Yunnan; *calophyllum*, B, white or pink, deep blotch, March to April, 30 to 40 ft., China; *campanulatum*, B, rosy purple, April, 12 to 18 ft., Himalaya; *campylocarpum*, B, yellow, April to May, 4 to 8 ft., Himalaya; *campylogynum*, A, rose-purple to black-purple, May, 6 ft., W. Yunnan; *camtschaticum*, A, reddish-purple, dwarf, deciduous, May, N.E. Asia; *catawbiense*, A, magenta, June, 10 ft., N. Carolina; *caucasicum*, A, yellowish, May, 3 to 4 ft., Caucasus; *ciliatum*, C, white, March to April, 6 ft., spreading, Himalaya; *cinnabarinum*, B, bright red, May to June, to 6 ft., Himalaya; *concatenans*, C, apricot, April to May, Himalaya; *Dalhousiae*, F, white, flushed pink, 6 to 10 ft., Himalaya; *dauricum*, B, rose-purple, Feb., 8 ft., deciduous, N.E. Asia, var. *sempervirens*, evergreen; *Davidsonianum*, B, pink, spotted red, April to May, to 10 ft., China; *decorum*, C, white, sometimes shell pink, Mar. to May, 12 to 20 ft., China; *dichroanthum*, B, deep orange, May to June, 6 ft., Yunnan; *discolor*, B, pink or white, July, China; *Edgeworthii*, F, white, April to May, 8 to 10 ft., Himalaya; *Elliottii*, D, deep rosy purple, May to June, small straggling shrub, Manipur; *eriogynum*, D, clear bright red, June, 10 ft., Tibet; *euchaetes*, C, crimson-scarlet, April to May, 15 to 20 ft., Yunnan and Burma; *Falconeri*, C, creamy white, April to May, 40 to 50 ft., Himalaya; *Fargesii*, B, bluish-pink, April, 20 ft., China; *fastigiatum*, A, light purple, May, erect shrublet, China; *ferrugineum*, A, rosy crimson, June, 3 to 5 ft., Switzerland; *fictolacteum*, B, white with dark crimson blotch, April, 15 to 45 ft., China; *flavidum*, A, pale yellow, March, small shrub, W. China; *formosum*, D, white, fragrant, May to June, to 8 ft., Himalaya;

Forrestii, B, dark crimson, April, creeping, China; *Fortunei*, B, pinky lilac, May, 15 to 20 ft., China; *fulgens*, B, bright scarlet, March, 6 to 12 ft., Himalaya; *fulvum*, B, white, flushed rose, crimson blotch, March to April, 20 ft., China; *glaucum*, B, pale old rose, May, aromatic foliage, 4 ft., Himalaya; *grande*, E, creamy white, purple blotch, Feb. to April, 30 ft., large leaves, Himalaya; *Griersonianum*, D, scarlet, June, 7 ft., China; *Griffithianum* (syn. *R. Aucklandii*), E, white, May, 14 to 20 ft., Himalaya; *haematodes*, B, scarlet-crimson, May, 3 to 4 ft., China; *Hanceanum*, C, pale yellow, April, 3 ft., China; *hippophaeoides*, A, lilac to rose, April, 2 to 3 ft., China; *hirsutum*, A, small rose pink, June, Mts. Europe; *Hookeri*, E, blood-red, March to April, 12 to 14 ft., Himalaya; *impeditum*, A, mauve or purplish-blue, April to May, to 1½ ft., Yunnan; *intricatum*, A, mauve, small shrublet, April to May, China; *javanicum*, F, red, bell-shaped, to 4 ft., Malaya; *Johnstoneanum*, C, pale yellow, fragrant, May, large bush, Manipur; *Keysii*, C, red, tipped yellow, June, 12 ft., Bhutan; *lacteum*, C, yellow, April to May, to 30 ft., Himalaya; *lapponicum*, A, purple, Jan. to Feb., to 1½ ft., Lapland; *ledoides*, C, clear rose, May, to 2 ft., Yunnan; *lepidotum*, A to C, pale yellow, pink or purple, June, 3 to 4 ft., Himalaya; *leucaspis*, C, white, Feb. to March, 1 to 2 ft., Tibet; *Loderi*, white to rose, fragrant, hybrid; *Ludlowii*, A, yellow, 1 to 2 ft., Bhutan; *lutescens*, C, pale yellow, Feb. to April, 5 ft., Caucasus; *Macabeanum*, C, pale yellow, purple spots, March, 45 ft., Assam; *Maddenii*, E, white-scented, June, 6 to 9 ft., Himalaya; *maximum*, A, light rose-purple or white, spotted yellow-green, July, 12 ft., N. America; *Metternichii*, B, rose, April, 3 to 8 ft., Japan; *micranthum*, A, small milky white, July, to 6 ft., China; *minus*, A, rose, June, to 10 ft., N. America; *moupinense*, B, white, sometimes pink, Feb., to 4 ft., W. China; *mucronulatum*, B, rosy purple, Jan., 7 to 8 ft., Korea and Japan; *myrtilloides*, A, small plum-coloured, May, 3 to 4 in., Burma; *neriiflorum*, C, scarlet, April, 3 to 9 ft., New Guinea; *niveum*, B, purple, April to May, 15 ft., Himalaya; *Nobleianum*, rose, hybrid; *Nuttallii*, F, light yellow, fragrant, April to May, 30 ft., Himalaya; *orbiculare*, B, rose-pink, April, 10 ft., W. China; *oreodoxa*, B, pink, March to April, shrub, W. China; *oreotrephes*, B, mauve, 7 ft., May, China; *pachytrichum*, C, white to pale rose, April, 6 to 18 ft., W. Szechuan; *parvifolium*, A, pale rosy magenta, to 1½ ft., Siberia, Korea; *pemakoense*, A, pinkish mauve, April, aromatic undershrub spreading by underground stolons, E. Tibet; *ponticum*, A, purple, June, to 10 ft., N. Asia Minor; *praecox*, rose-purple, March to April, hybrid; *racemosum*, A, pink, March to May, 3 to 4 ft., China; *radicans*, B, purple, May, 2 to 4 in., prostrate, Tibet; *repens*, A, scarlet, April to May, 6 to 12 in., creeping, W. China; *rubiginosum*, A, small rosy lilac, April to May, to 30 ft., Yunnan; *russatum*, A, blue-purple, April to May, to 4 ft., Yunnan; *sanguineum*, B, crimson, May, 3 ft., W. Yunnan; *scintillans*, A, lavender-blue, early April, 2 to 3 ft., Yunnan; *sinogrande*, D, creamy white, April, 20 to 30 ft., China; *Souliei*, B, white to soft rose, late May, 6 to 12 in., China; *spinuliferum*, C, crimson to brick-red, April, 6 to 8 ft., China; *strigillosum*, D, crimson-scarlet, March, 12 to 20 ft., China; *sutchuenense*, B, rosy lilac, sometimes lilac-white, Feb. to March, 10 to 20 ft., China; *Taggianum*, E, pure white, fragrant, April to May, 6 to 8 ft., China; *tephropeplum*, C, magenta-rose, April to May, 2 to 7 ft., S.E. Tibet; *Thomsonii*, B, blood-red, April, 6 to 14 ft., Himalaya; *triflorum*, D, light yellow, spotted green, Himalaya; *Veitchianum*, F, white, tinged green, 3 ft., Himalaya; *venator*, C, scarlet, end May, 8 to 12 ft., Tibet; *Wightii*, B, pale yellow, crimson blotch, April, 10 to 15 ft., Himalaya; *Williamsianum*, C, shell pink, April, 3 to 5 ft., W. China; *yunnanense*, B, pinkish or nearly white, end May, to 6 ft., China.

AZALEA SECTION: *R. arborescens* (syn. *A. arborescens*), A, white or pinkish, June to July, 8 to 17 ft., N. America; *calendulaceum* (syn. *A. calendulacea*), A, 'Flame Azalea', yellow or orange to scarlet, May to June, 4 to 10 ft., N. America; *indicum* (syn. *A. indica*, but not the *A. indica* of the trade, which is *R. Simsii*), red to scarlet, June, 6 ft., evergreen, Japan, var. *balsaminaeflorum* (syn. *A. rosaeflora* of trade), double salmon-red; *linearifolium* (syn. *A. linearifolia*), B, rose-pink, April to May, to 4 ft., evergreen, Japan; *luteum* (syns. *A. pontica*, *R. flavum*), A, yellow,

fragrant, May, 12 ft., Caucasus and E. Europe; *molle* (syns. *A. mollis*, *R. sinense*), C, yellow, May, 4 ft., China; *mucronatum* (syn. *A. ledifolia*), C, white, May, 6 to 10 ft., evergreen, Japan; *nudiflorum* (syn. *A. nudiflora*), A, pink or whitish, May, 2 to 8 ft., N. America; *obtusum* (syn. *A. obtusa*), A, purple through reds and pink to white, May, 3 ft., evergreen, Japan, vars. *japonicum*, 'Kurume Azalea', *amoenum*, 'Amoenum Azalea'; *occidentale* (syn. *A. occidentalis*), A, white or pink with yellow blotch, June, 8 ft., N. America; *reticulatum* (syns. *A. reticulata*, *R. dilatatum*, *R. rhombicum*), A, bright purple, April to May, to 25 ft., Japan; *Schlippenbachii* (syn. *A. Schlippenbachii*), C, pale to rose-pink, April to May, 3 to 15 ft., Korea, Manchuria, Japan; *Simsii* (*A. indica* of trade), F, 'Indian Azalea', rose-red, May, 5 ft., China; *Vaseyi* (syn. *A. Vaseyi*), B, pale pink to pink, May, N. Carolina; *viscosum* (syn. *A. viscosa*), A, white or suffused pink, July, 8 to 12 ft., N. America; *yedoense* (syn. *A. yodogawa*), B, pale rosy purple, double, May, 2 to 6 ft., Japan.

Rhodohypoxis—*Amaryllidaceae*. Dwarf, hardy, bulbous plants.

CULTURE: Well-drained, sandy, moist loam and sunny position in rock garden.

PROPAGATION: By seeds sown in compost as above; offsets.

SPECIES CULTIVATED: *R. Baueri*, rose-red, early summer, 2 in., Natal; *platypetala*, white or soft pink, early summer, 2 in., Natal. There are also many variously coloured garden hybrids.

Rhodothamnus (Ground Cistus)—*Ericaceae*. Hardy evergreen flowering shrub. First introduced late eighteenth century.

CULTURE: Soil, equal parts peat, loam and sand. Position, fissures between pieces of limestone on rockeries. Plant, March or April. Water freely in dry weather.

PROPAGATION: By means of division at planting time, pulling off pieces with a few roots attached, as advised for rhododendron, and by seeds.

SPECIES CULTIVATED: *R. Chamaecistus* (syn. *Rhododendron Chamaecistus*), pink, spring, 6 to 12 in., Austrian Alps.

Rhodotypos—*Rosaceae*. Hardy deciduous flowering shrub with showy black berries in winter. First introduced mid-nineteenth century.

CULTURE: Soil, good ordinary. Position, against south or west walls or fences or in open border. Plant, Oct. to March. Prune in May or June, cutting off old or weak shoots only.

PROPAGATION: By cuttings of half-ripened shoots in sandy soil under bell-glass in brisk bottom heat.

SPECIES CULTIVATED: *R. scandens* (syn. *R. kerrioides*), white, May to July, 4 to 6 ft., China and Japan. This shrub is frequently erroneously called *Kerria japonica alba*.

Rhoeo—*Commelinaceae*. Greenhouse herbaceous perennial. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, pots or baskets suspended from roof. Pot, Jan. to April. Water freely March to Oct., moderately afterwards. Shade from strong sunshine. Temp., Oct. to April 40° to 50°, April to Oct. 55° to 65°.

PROPAGATION: By cuttings of young shoots inserted in light soil under a bell-glass in above temp., March to Oct.

SPECIES CULTIVATED: *R. discolor* (syn. *Tradescantia discolor*), white, summer, creeping, Mexico, and var. *vittata* (syn. *Tradescantia variegata*), leaves striped with pale yellow.

Rhopalostylis—*Palmae*. Stove feather palms. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould and sand. Position, pots or tubs in moist, shady greenhouse or conservatory. Pot, Feb. or March. Water copiously April to Oct., moderately afterwards. Apply stimulants occasionally May to Sept. Keep piece of sulphate of iron on surface of soil to ensure

deep green foliage. Syringe twice daily April to Sept., once daily afterwards. Temp., March to Sept. 70° to 85°, Sept. to March 55° to 65°.

SPECIES CULTIVATED: *R. Baueri* (syn. *Areca Baueri*), 20 ft. or more, Norfolk Island; *sapida* (syns. *Areca* or *Kentia sapida*), 10 to 20 ft., New Zealand.

Rhubarb, see *Rheum Rhaponticum*.

Rhus (Sumach)—*Anacardiaceae*. Hardy deciduous flowering trees, shrubs and climbers with brilliantly coloured foliage in autumn. Two species hardy in this country, *R. radicans* and *R. vernix*, produce acrid and poisonous juices and should not be generally planted. A few species previously included in this genus have been transferred to *Cotinus*. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, sunny borders or shrubberies; walls or old tree trunks for *R. radicans*. Plant, Oct. to Feb. Prune flowering species moderately after blooming, others in Nov. or Dec.

PROPAGATION: By cuttings of firm shoots, 6 to 8 in. long, in ordinary soil in cold frame or under hand-light, Oct. to Nov.; cuttings of roots, 2 or 3 in. long, planted 3 in. deep in sandy soil, Oct. or Nov.; layering shoots in autumn.

SPECIES CULTIVATED: *R. aromatica* (syn. *R. canadensis*), yellow, April, 3 to 5 ft., N. America; *copallina*, 'Shining Sumach', yellowish, July to Aug., 3 to 5 ft., red fruits, Eastern N. America; *glabra*, 'Smooth Sumach', 4 to 10 ft., close erect panicles of small fruits densely covered with crimson hairs, U.S.A., and var. *laciniata*, leaves finely cut; *radicans* (syn. *R. Toxicodendron*), 'Poison Ivy', red-tinted foliage in autumn, 8 to 9 ft., Eastern U.S.A.; *typhina*, 'Stag's Horn Sumach', 15 to 25 ft., crimson panicle of small fruits, var. *laciniata*, feathery foliage; *vernix*, 'Poison Sumach', to 20 ft., leaves orange and scarlet in autumn but highly poisonous to the touch, U.S.A.

Rhynchostylis—*Orchidaceae*. An epiphytic genus, closely allied to *Saccolabium* and sometimes included in that genus. Leaves leathery. Flowers many, thickly set in axillary racemes, showy stems, stout, rather short.

CULTURE: Compost, temps., etc., as for *Saccolabium* but the leaf texture must have consideration in winter waterings. Baskets are preferable to pots, root disturbance can be avoided by picking out the old and stale compost and replacing with new as required.

PROPAGATION: Occasionally basal growths are produced but the plants resent disturbance. Sometimes imported plants may be carefully divided.

SPECIES CULTIVATED: *R. coelestis*, white, tipped deep blue, spike ascendant, summer, Siam; *retusa*, variable, fragrant, white, spotted amethyst-purple, lip purple in front, spike pendulous, summer, India, Burma, Java, etc., var. *guttata*, flowers smaller, more numerous, densely spotted.

Rhyncospermum, see *Trachelospermum*.

Ribbon Fern, see *Pteris serrulata*; **-Grass**, see *Phalaris arundinacea* var. *picta*.

Ribes—*Saxifragaceae*. Hardy deciduous fruit-bearing and flowering shrubs including *Grossularia*, which some botanists recognise as a separate genus. Berries oblong or globose, seeds plentiful.

CULTURE OF BLACKCURRANT: Soil, good ordinary. Position, sunny. Plant 5 ft. apart each way, Nov. to Feb. Fruit borne on shoots of previous year's growth. Pruning, thin out old shoots, Nov. to Feb. Tipping young shoots encourages large, even fruits.

CULTURE OF RED AND WHITE CURRANT: Soil, good ordinary. Position, sunny for early crops, against north walls or fences for late ones. Plant, Nov. to Feb., 5 to 6 ft. apart each way. Pruning, allow current year's branch extension shoots to remain and shorten others to within four leaves of their base in June or July. Cut back the extension shoots by half in young bushes or to leave only 1 in. of new growth in large old bushes, between Nov. and Feb.; at same time cut back summer-pruned laterals to ½ in. and cut out old or distorted branches. Fruit borne on spurs on older wood.

CULTURE OF GOOSEBERRY: Soil, good ordinary. Position, sunny for early crops, against north or east walls for late crops. Plant, Nov. to Feb., 5 to 6 ft. apart each way. Pruning, either spur all side shoots to 1 in. for large dessert fruit or allow long spurs for greater quantity of fruit. In each case keep centre of bush open to facilitate picking. Spur side shoots of cordon trees.

MANURES FOR CURRANTS AND GOOSEBERRIES: Blackcurrants are gross feeders and require plenty of nitrogen. Give an autumn mulch of compost mixed with chicken manure or of well-rotted stable manure or dress with a complete fertiliser 4 oz. per square yard and apply 1 oz. per square yard sulphate of ammonia in spring. Extra potash should be applied to red and white currants, and gooseberries, apply 2 oz. per square yard sulphate of potash in spring. Muriate of potash causes leaf scorch.

CULTURE OF FLOWERING CURRANTS: Soil, ordinary. Position, sunny. Plant, Oct. to Feb. Pruning, remove some of older wood after flowering. Top-dress occasionally with decayed manure in autumn.

PROPAGATION: By cuttings, 6 to 8 in. long, inserted in ordinary soil outdoors, Oct. to Feb.

FRUITING SPECIES CULTIVATED: *R. Grossularia*, 'English Gooseberry', to 3 ft., Europe, N. Africa, S.W. Asia; *nigrum*, 'European blackcurrant', to 6 ft., Europe, Asia; *rubrum*, 'Northern Redcurrant', to 6 ft., Europe, Asia; *sativum* (syn. *R. vulgare*), 'Common Garden Currant', fruit red or white, to 5 ft., W. Europe.

FLOWERING SPECIES CULTIVATED: *R. alpinum*, 'Alpine Currant', greenish-yellow, fruit scarlet, April and May, 8 ft., Europe; *americanum*, 'American Blackcurrant', black fruits, crimson and yellow foliage in autumn, 3 to 4 ft., N. America; *aureum*, 'Buffalo Currant', yellow, April, 6 to 8 ft., N. America; *Gordonianum*, yellow and red, April and May, 6 to 8 ft., hybrid; *sanguineum*, 'Flowering Currant', rose, May, 6 to 8 ft., California, vars. *album*, white, *splendens*, fine deep red; *speciosum*, 'Fuchsia-flowered Gooseberry', rich red flowers, April and May, 6 to 9 ft., California.

Riccia (Crystalwort)—*Ricciaceae*. Tender floating aquatics, much used by aquarists. Masses of tiny leaves tangled together in packs 1 to 2 in. deep at times.

CULTURE: No planting, simply drop on surface of water; temp. should not fall below 60°.

PROPAGATION: By division, any time.

SPECIES CULTIVATED: *R. fluitans*, Trop. America; *natans*, green, Trop. America.

Rice Flower, see Pimelca; **-paper Tree**, see *Tetrapanax papyriferum*.

Richardia, see Zantedeschia.

Ricinus—*Euphorbiaceae*. Half-hardy annual herb; in the Tropics a tree to 40 ft. high. Flowers insignificant. Large, greenish-purple, palmate leaves. First introduced early sixteenth century.

INDOOR CULTURE: Sow seeds, previously steeped for a few hours in tepid water, $\frac{1}{2}$ in. deep in pots of light, sandy soil in temp. of 60° to 65° in March, transplanting seedlings when three leaves form, singly into 2 in. pots, and keep in similar temp. until well rooted, then transfer to 5 or 6 in. pots, after which remove to cool greenhouse or dwelling-room. Water moderately. Shade from sun.

OUTDOOR CULTURE: Sow seeds and transplant into small pots as above. Transfer to cold frame or pit in May to harden. Plant out, June. Position, sunny beds or borders.

SPECIES CULTIVATED: *R. communis*, 'Castor Oil Plant', 3 to 6 ft., Trop. Africa, and several vars. *borboniensis arboreus*, *cambodgensis*, *Gibsonii*, *sanguineus*, *zanzibarensis*, etc.

Rivina—*Phytolaccaceae*. Greenhouse evergreen berry-bearing plant. Flowers succeeded by scarlet berries. Pretty for table decoration. First introduced late seventeenth century.

CULTURE: Compost, equal parts leaf-mould and sandy loam, half a part silver

sand. Position, small, well-drained pots in light part of warm greenhouse (temp. 50° to 60°), Sept. to June; cold, sunny frames, June to Sept. Pot, Feb. or March. Water freely April to Oct., moderately afterwards. Apply weak stimulants occasionally Oct. to Feb. Shade from sun. Best results obtained by raising plants from seed or cuttings annually.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots or shallow pans of good light soil placed in temp. 55° to 65°, spring; cuttings of young shoots inserted in Feb., March or April in small pots of light, sandy soil in temp. of 65° to 75°, spring.

SPECIES CULTIVATED: *R. humilis* (syn. *R. aurantiaca*), 'Rouge Berry', 'Blood Berry', white, June, 1 to 3 ft., red fruits, Trop. America.

Robinia (False Acacia)—*Leguminosae*. Hardy deciduous flowering trees and shrubs. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, sunny well-drained borders and shrubberies. Plant, Oct. to Feb. Prune, Nov. to Feb. Rose Acacia (*R. hispida*) may be grown against south or west walls, side shoots being pruned annually to 1 in. of base, Nov. or Dec. Not suitable for exposed places as shoots and branches are brittle.

PROPAGATION: Choice vars. by grafting on common species (*R. Pseudoacacia*) in March; other kinds by seeds sown $\frac{1}{2}$ in. deep in ordinary soil outdoors Nov. or March: suckers removed from parent tree and planted Oct. or Nov.

SPECIES CULTIVATED: *R. ambigua* var. *bella-rosea*, large rich pink flowers, June, 25 to 35 ft., hybrid origin; *Boyntonii*, rose pink, 6 to 8 ft., U.S.A.; *Elliottii*, purple and white, May to June, 5 ft., U.S.A.; *hispida*, 'Rose Acacia', rose, May, 6 to 8 ft., Southern U.S.A., var. *macrophylla*, without prickles; *Kelseyi*, rose, June, 8 to 12 ft., Eastern U.S.A.; *Pseudoacacia*, 'Locust Tree', white, June, 70 to 80 ft., Eastern U.S.A., and vars. *aurea*, golden-leaved, *Bessoniana*, larger but fewer leaflets, *Decaisneana*, pink-flowered, *inermis*, mop-headed, and *semperflorens*, flowering throughout the summer; *Slavini*, lilac-pink, June, attractive habit, 15 to 20 ft., hybrid; *viscosa*, pale rose and yellow, June, 30 to 40 ft., Carolina.

Rocambo, see *Allium Scorodoprasum*.

Rochea—*Crassulaceae*. Greenhouse succulent plants. First introduced early eighteenth century.

CULTURE: Compost, equal parts sandy loam, brick rubble, dried cow manure and river sand. Position, well-drained pots in light greenhouse, close to glass. Pot, March. Water freely April to Aug., moderately Aug. to Nov., very little afterwards. Prune old plants after flowering, shortening shoots to 1 in., and repot when new shoots are 1 in. long. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 50°.

PROPAGATION: By seeds sown in well-drained pots or pans of sandy soil, just covering seeds with fine soil, in temp. 60° to 70° in March or April; seedlings to be kept close to glass and have little water; cuttings of shoots, 2 to 3 in. long, exposed to sun for few days, then inserted in June, July or Aug. in well-drained pots of sandy soil, placed on greenhouse shelf, and given very little water.

SPECIES CULTIVATED: *R. coccinea*, scarlet, July, 1 ft., S. Africa; *jasminea*, white, spring, 6 to 9 in., S. Africa; *versicolor*, white and pink, spring, 2 ft., S. Africa. See also *Crassula*.

Rock Cress, see *Arabis*; **-foil**, see *Saxifraga*; **-Forget-me-not**, see *Omphalodes Luciliae*; **-Jasmine**, see *Androsace*; **-Lettuce**, see *Phyteuma pinnatum*.

Rocket, see *Hesperis*.

Rodgersia—*Saxifragaceae*. Hardy herbaceous perennials. Leaves very large, bronze-green. *R. tabularis* is sometimes placed in a separate genus, *Astilboides*. First introduced late nineteenth century.

CULTURE: Compost, two parts peat, one part loam. Position, partially shaded border. Plant, March or April. Water freely in dry weather. Protect in severe weather with covering of fern fronds or litter.

PROPAGATION: By division, March or April.

SPECIES CULTIVATED: *R. aesculifolia*, rosy white, summer, 2 to 3 ft., bronze foliage, China; *pinnata*, rosy crimson, summer, 2 to 3 ft., China; *podophylla*, 'Rodgers's Bronze Leaf', creamy white, summer, 3 ft., Japan; *tabularis*, creamy white, summer, 3 ft., bright green foliage, N. China.

Rodriguezia—*Orchidaceae*. An epiphytic genus. Pseudo-bulbs small, leaves rather leathery, a few inches long. Habit, tufted on the pseudo-bulbs at intervals, scapes from their base, often arched or pendulous. Flowers usually showy, the lower sepals generally joined and concealed, or partially so, by the lip. Some species were formerly known as *Burlingtonia*.

CULTURE: Compost, osmunda fibre or substitute and sphagnum moss in equal quantities. Baskets or pots, which can be suspended, preferably in pots. Species with extending rhizomes, a narrow trough-like raft. Water liberally in summer, and maintain a warm (70° or more) moist atmosphere with shading, drainage ample for all. Winter night temp. around 65°. Winter waterings are required but avoid a sodden or arid compost. The syringe may be used freely in summer days and in winter if pipe heat is excessive. Position, should be near the glass and watch must be kept against attacks of red spider and mealy bug.

PROPAGATION: By division of plants, not too small, in spring.

SPECIES CULTIVATED: A selection—*R. Batemannii*, fragrant, white, flushed or streaked rose, various, Brazil, Peru; *candida*, fragrant, white, lip large, with yellowish keels, spring, Brazil; *decora*, white, rose-flushed, red spotted, lip generally white, pseudo-bulbs at intervals, summer, Brazil; *maculata*, fragrant, yellow, cinnamon spotted, keels on lip unequally toothed, spring, summer, Brazil; *pubescens*, fragrant, white, lip emarginate, with yellow keels, column downy, summer, Brazil; *secunda*, many, comparatively small, rose-purple, summer, Brazil, Trinidad; *venusta*, fragrant, white, lip with yellowish centre, variable, summer, various, Brazil.

Roella—*Campanulaceae*. Greenhouse evergreen shrub. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts of peat and loam and a fair quantity of sand. Position, pots in light and dry part of greenhouse. Pot, March. Water very carefully during spring and summer and give very little in autumn and winter. Syringing or wetting the foliage must be avoided at all seasons. Ventilate freely in summer and moderately at other times. Dry atmosphere essential in autumn and winter. Remove flowers directly they fade; also all blooms that form in autumn and winter. Temp., Sept. to April 40° to 45°, April to Sept. 50° to 60°.

PROPAGATION: By cuttings of strong shoots, 2 in. long, inserted in moist sand in temp. 58° in spring. Shade from sun.

SPECIES CULTIVATED: *R. ciliata*, 'South African Harebell', white and purple, summer, 1 ft., S. Africa.

Romanzoffia—*Hydrophyllaceae*. Hardy perennial herb. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, sunny ledges of rockery. Plant, March or April.

PROPAGATION: By division, March or April.

SPECIES CULTIVATED: *R. sitchensis*, 'Sitcha Water-leaf', white, spring, 3 to 4 in., N.W. America; *Suksdorffii*, white, spring, 2 in., N. America; *unalaschkensis*, white, 3 in., Aleutian Islands.

Romneya—*Papaveraceae*. Slightly tender perennials. First introduced mid-nineteenth century.

OUTDOOR CULTURE: Soil, sandy loam with peat and leaf-mould. Position, well-drained border at base of south wall or sheltered sunny rockery. Plant, April or May. Protect in severe weather with covering of fern or litter.

PROPAGATION: By seeds sown in sandy soil in well-drained pans during Feb. or

March in temp. 55°; root-cuttings in sandy compost during Feb. in temp. 55°, placing cuttings singly in small pots; suckers.

SPECIES CULTIVATED: *R. Coulteri*, 'Californian Tree Poppy', white, fragrant, late summer and autumn, 4 to 6 ft., California, var. *trichocalyx*, white, fragrant, Aug. to Oct., 5 ft.; *hybrida* (syn. *R. Vandendenii*), white, July, Aug., 3 ft., California.

Romulea—*Iridaceae*. Hardy and half-hardy bulbous plants. First introduced early eighteenth century.

CULTURE: Soil, light, rich, sandy. Position, sunny well-drained border. Plant, Sept. to Jan., placing tubers 4 in. deep and 2 in. apart. Lift and replant tubers annually. Mulch surface of bed in March with cow manure.

PROPAGATION: By offsets.

SPECIES CULTIVATED: *R. Bulbocodium*, yellow and violet, March to April, 4 to 6 in., Europe; *Clusiana*, lavender and orange, spring, 9 in., Spain and Portugal; *parviflora*, lilac, May, 6 in., Europe; *ramiflora*, yellow and lilac, May, 6 to 8 in., Medit. Region; *Requienii*, violet, spring, 4 in., Corsica; *rosea*, carmine, March to May, 6 in., S. Africa.

Rondeletia—*Rubiaceae*. Stove evergreen flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts rough fibrous peat and loam, one part equal proportions charcoal lumps and coarse silver sand. Position, well-drained pots in light part of stove with shoots trained to sticks or trellis. Pot, Feb. or March. Prune moderately after flowering. Water freely April to Oct., moderately afterwards. Syringe daily March to Sept. Shade from bright sunshine. Temp., March to Sept. 70° to 80°, Sept. to March 55° to 60°.

PROPAGATION: By cuttings of firm shoots inserted in pure sand under bell-glass in temp. 75° to 85°, spring or summer.

SPECIES CULTIVATED: *R. amoena*, pink, summer, 3 to 4 ft., Mexico; *cordata*, pink or dull red, summer, 3 to 7 ft., Guatemala; *odorata* (syns. *R. splendens* and *speciosa*), orange-red and yellow, fragrant, summer, 4 to 6 ft., Cuba and Mexico.

Roripa, see *Nasturtium* and *Armoracia*.

Rosa (Rose)—*Rosaceae*. Hardy and slightly tender deciduous and evergreen flowering shrubs, mostly prickly.

CLASSIFICATION: Summer-blooming, Provence, Moss, Damask, Hybrid China, Hybrid Bourbon, Hybrid Noisette, Alba, Rugosa, Austrian Brier, Scotch, Sweet-brier, Ayrshire, Boursault, Banksian, Evergreen, Polyantha, Multiflora and Wichuraiana. Summer- and autumn-blooming, Hybrid Perpetual, Hybrid Tea, Tea, Noisette, China, Lawrancia, Bourbon Perpetual, Hybrid Musk, Hybrid Bracteata, Pernetiana, Hybrid Polyantha, Polyantha Pompon and Hybrid Rugosa.

CULTURE OF DWARF ROSES: Soil, deep, rich loam well enriched with decayed manure. Add clay and cow dung to light soils, road grit, leaf-mould, burnt refuse, horse dung and lime to heavy soils. Do not mix lime with manure but apply to surface after manure has been well dug in. Position, sunny beds or borders. Plant, Nov. or Feb. to March, average distance apart 18 in. to 2 ft. Depth of soil over roots should be 4 to 6 in. on heavy and 7 to 8 in. on light soils. Prune, end of March or early in April. Hybrid Perpetuals should have damaged and weak shoots removed and others shortened to dormant bud 9 to 18 in. from base, according to strength. After first flowering is finished in early July remove dead flowers by shortening young shoots by one-third to a strong bud facing outwards. Hybrid Teas, Teas and Pernetianas, remove damaged and weak shoots and shorten others to dormant bud 3 to 9 in. from base according to strength. Noisettes, thin out all weak and worn-out wood and shorten others a little according to strength, leaving the best of the previous year's growth full length. Bourbons, remove old and weakly growth but leave the best lateral bearing wood unpruned. Provence, Damask, Moss, Chinas and Pompons, thin out the oldest

and weakest wood so as to make room for healthy new growth, which should be retained full length. Austrian and Scotch Briers, thin out weak or dead growths only. Hybrid Sweetbriers, thin out older shoots after flowering. Generally speaking, it is wise to prune more severely in the first spring after planting for all types, always cut to a bud facing outwards. Protect Tea, China and tender roses in winter by drawing soil to height of 6 in. round the base of each plant and place bracken or dry litter among the shoots.

CULTURE OF STANDARD ROSES: Soil, position and planting as for dwarfs. Distance apart, minimum 4 ft., or among bush roses from 4 to 6 ft. Pruning: Hybrid Perpetuals, Hybrid Teas, Teas, thin out weak shoots in centre of tree and shorten remaining shoots to 3 to 9 in. according to vigour.

CULTURE OF CLIMBING ROSES: Soil, as advised for dwarfs. Position, against walls, fences, arbours, pergolas, arches, tree trunks, trellises, pillars, etc. Distance apart to plant, 5 to 6 ft. Plant in Oct. or Nov. or in March. Pruning: Rambler type, cut away old flowering shoots after blooming and thin out dead or weakly growths in April, no further pruning required. Banksian type, thin out the strong young shoots not required to add to size of plant directly after flowering. Do not remove older or small shoots. Teas, Noisettes, Hybrid Teas, Singles, etc., grown as climbers, thin old flowering shoots after blooming and cut out dead or weak growths in April and, at the same time, cut off the unripened tips of shoots. Ayrshire, Boursault and Evergreen types only need to have weak growths thinned out in March.

CULTURE OF WEEPING ROSES: Soil and planting, as advised for dwarfs. Distance to plant, 10 ft. Pruning, thin out weak and old growths immediately after flowering and train in the young wood for next year's flowering, and, in March, remove soft unripened tips of shoots.

CULTURE OF ROSES IN POTS: Classes suitable for pot culture, Hybrid Perpetual, Hybrid Tea, Tea-scented and Polyantha. Compost, two parts turfy loam, two parts rotted cow or hotbed manure, one part sand. Pot, Oct. Repot annually in Aug. or Sept. Prune newly lifted and potted plants in Nov., shortening shoots to three, two or one 'eyes' of the base according to size; established plants of Hybrid Perpetuals and Hybrid Teas to six, three and two 'eyes'; Tea-scented, Chinese, Fairy and Polyantha kinds to eight, six and four 'eyes' in Nov. for early flowering, Dec. or Jan. for late flowering. Position, sheltered corner outdoors with pots protected from frost by straw, or in cold frame Oct. to Jan., greenhouse Jan. to May, sunny place outdoors afterwards. Water moderately Jan. to April, freely April to Dec., keep nearly dry Oct. to Jan. Apply stimulants once or twice during flowering period. Syringe freely in greenhouse. Temp. for forcing, 40° by night and 45° by day; Feb., 45° by night, 55° by day; March and onwards, 55° by night and 60° to 65° by day. Plants for forcing require to be established in pots one year.

CULTURE OF CLIMBERS IN GREENHOUSE: Compost, same as for pots. Beds or tubs for each plant 18 in. deep and 2 ft., wide, each to be provided with 3 in. of drainage. Plant, Sept. to Nov. or March. Prune each shoot first year to within 8 in. of its base at time of planting; second and future years thin out old wood and shorten young growth by a third or a half according to strength, immediately after flowering. Water freely March to Nov., keep nearly dry afterwards. Apply stimulants weekly, April to Sept., to established plants. Syringe daily in spring. Admit air freely in summer and autumn to ripen shoots.

MANURE FOR ROSES: Cow or pig dung for light soils, horse manure for heavy ones. Top-dress with above directly after pruning and lightly fork in. Suitable artificial manure—superphosphate of lime, 48 lb.; sulphate of potash, 20 lb.; sulphate of ammonia, 25 lb.; sulphate of iron, 4 lb. Mix thoroughly together and apply at the rate of 3 oz. per square yard directly after pruning; one dose a year is sufficient. Liquid soot-water, cow and sheep dung also good for roses outdoors or in pots, especially applied generously after the first summer blooming is over.

STOCKS FOR ROSES: For standards, the wild dog rose of the hedgerows, and

Rugosa; dwarfs and climbers, seedling and cutting wild dog rose, Manetti, de la Grifferae, Rugosa, Laxa and Multiflora (often known as Polyantha Simplex).

PROPAGATION: By seeds, preferably stratified, sown $\frac{1}{8}$ in. deep in light sandy soil in cold frame in March or April, or $\frac{1}{2}$ in. deep in ordinary soil outdoors in April, transplanting seedlings when a year old; cuttings, 6 to 8 in. long, in sheltered position outdoors, Sept. to Nov.; small side shoots of tea-scented and other kinds removed with a little old stem attached and inserted in small pots of light sandy soil in summer under a bell-glass or in a propagator; budding in July; grafting in Feb. or March in temp. 55° to 65°. Practically all nursery stock is budded. Seed provides new types, also stocks for budding. Cuttings will be found to provide useful new stock and are easily raised but scarcely as long-lived as budded plants.

SPECIES CULTIVATED: *R. acicularis*, large rose pink, May, 6 ft., for wild garden, Europe to Japan; *alba*, large single, white or blush, June, 6 ft., hybrid; *arvensis*, white, branches trailing, Europe, var. *Ayrshirea*, 'Ayrshire Rose'; *Banksiae*, 'Banksian Rose', double and single white and yellow, climbing to 20 ft., no pruning, for warm sunny districts, China; *Beggeriana*, silvery leaves, white, June, 6 ft., Afghanistan, N. Persia; *blanda*, rose, June, 4 to 6 ft., N. America; *borboniana*, 'Bourbon Rose', purple, summer, 6 ft., hybrid; *bracteata*, large white, summer, to 20 ft., evergreen, for warm sunny walls, China; *canina*, 'Wild Rose', 'Dog Rose', pink, summer, Europe and W. Asia, used as stock for budding; *carolina*, crimson, June to Aug., 4 to 6 ft. for wild garden, Eastern N. America; *centifolia*, 'Cabbage Rose', red, fragrant, summer, 6 ft., one of the oldest known roses, Caucasus, and vars. *muscosa*, 'Moss Rose', and *parvifolia*, 'Burgundie Rose'; *chinensis*, 'China Rose', white, blush to red, June to Sept., 3 to 4 ft., China, and vars. *minima* (syn. *R. Lawrenceana*), a race of dwarf forms (*Roulettii*, with pink flowers, belongs here), and *viridiflora*, 'Green Rose'; *cinnamomea*, 'Cinnamon Rose', red, May, 6 to 9 ft., spicily fragrant, Europe, N. China, Siberia, and var. *plena*, double; *damascena*, 'Damask Rose', pink to red, June, 4 to 6 ft., Asia Minor. and vars. *trigintapetala*, cultivated in S. Europe for manufacture of attar, and *versicolor*, 'York and Lancaster Rose', white, striped pink; *Davidii*, rose pink, June, bottle-shaped fruits, vigorous to 12 ft., W. China; *Dupontii*, large single, pale pink, July, 4 to 6 ft., attractive and graceful hybrid; *Ecae*, buttercup yellow, June, 3 to 4 ft., Afghanistan; *Eglanteria* (syn. *R. rubiginosa*), 'Sweetbrier' or 'Eglantine', pale pink, summer, fragrant leaves, 6 to 9 ft., Europe, including Britain, parent of Penzance Briers; *foetida* (syn. *R. lutea*), 'Austrian Brier', yellow, June to July, 4 to 8 ft., beautiful climber, Asia Minor to Afghanistan, vars. *bicolor*, 'Austrian Copper', copper red, *persiana*, 'Persian Yellow', double yellow; *gallica*, 'French Rose', the oldest rose of European cultivation, pink or crimson, to 4 ft., Europe, W. Asia, var. *officinalis*, 'Provence Rose'; *Helena*, white, fragrant, large clusters, 12 to 15 ft., vigorous, Cent. China; *highdownensis*, hybrid of *R. Moyesii*, similar but vigorous and free-fruiting; *Hugonis*, single yellow, May, 8 ft., vigorous, W. China; *laevigata*, 'Cherokee Rose', rather tender, 5 in. white flowers, May to June, climbing to 15 ft., China; *Lheritierana*, 'Boursault Rose', red, 20 ft., hybrid; *macrophylla*, blush red, June, 8 to 10 ft., red pear-shaped fruits, Himalaya; *moschata*, 'Musk Rose', large clusters cream flowers, June, 10 to 15 ft., S. Europe, India, China; *Moyesii*, beautiful dark velvety red, June, 6 to 10 ft., red bottle-shaped hips, China; *multibracteata*, pink, June, 6 to 10 ft., fern-like foliage, orange-red fruits, W. China; *multiflora*, large clusters, white, June, 10 to 15 ft., vigorous, N. China and Japan, and var. *platyphylla*, 'Seven Sisters' Rose', pink, also parent with *R. chinensis* of polyantha roses; *nitida*, rosy red, June, to 2 ft., autumn tints, Eastern N. America; *Noisettiana*, 'Noisette Rose', white, large clusters, July to Aug., hybrid; *nuthana*, bright red, July, 6 to 10 ft., Western N. America; *odorata*, 'Tea Rose', white, pale pink or yellow, almost evergreen, China; *omeiensis*, 'Mount Omi Rose', white, May to June, ferny foliage, 10 to 12 ft., China, with vars. *chrysocarpa*, yellow fruits, *pteracantha*, striking red thorns; *pendulina* (syn. *R. alpina*), pink, June, thornless, Europe; *Primula*, primrose yellow, April to May,

red twigs, 4 to 6 ft., Turkistan to N. China; *Richardii* (syn. *R. sancta*), pale pink, June to July, 4 ft., spreading, Abyssinia; *rubrifolia*, pink, June to July, 4 to 8 ft., striking glaucous purplish-tinted foliage, Cent. Europe; *rugosa*, 'Ramanas Rose', red or white, fragrant, June to July, 4 to 7 ft., bright red fruits and autumn-tinted foliage, China and Japan, and many attractive vars. for shrub borders; *sericea*, white, May to June, 10 to 12 ft., spreading, India; *setigera*, 'Prairie Rose', deep rose, July to Aug., rambling to 12 ft., Ontario to Florida; *setipoda*, purplish-rose, June to July, 6 to 10 ft., Cent. China; *Soulieana*, cream, July, 10 to 12 ft., vigorous and spreading, greyish foliage, W. China; *spinosissima*, 'Scotch or Burnet Rose', white or pale pink, May to June, 3 to 4 ft., spreading, Europe, N. Asia, numerous vars. including *altaica*, creamy yellow, 6 ft., *lutea*, buttercup yellow, *myriacantha*, pale pink, very spiny; *Sweginzowii*, purplish-rose, June to July, 6 to 10 ft., oblong fruits, N.W. China; *virginiana*, pink, June to July, 3 to 6 ft., Eastern N. America; *Watsoniana*, finely cut foliage, trailing, for rockery, Japan; *Webbiana*, bright pink, June, glaucous stems, graceful habit, 4 to 6 ft., Himalaya; *Wichuraiana*, white, June to July, 8 to 12 ft., glossy foliage, Japan, parent of types such as Dorothy Perkins, Hiawatha and New Dawn; *Willmottiae*, rose, May to June, 6 to 10 ft., very spiny, W. China; *xanthina*, pale yellow, May, ferny leaves, 5 to 8 ft., N. China, Korea, var. *spontanea*, single flowered.

Rosary Pea, see *Abrus precatorius*.

Roscoea—*Zingiberaceae*. Dwarf hardy perennials of great charm and beauty. First introduced early nineteenth century.

CULTURE: Soil, sandy loam and leaf-mould. Position, woodland gardens or half-shady, sheltered borders. Plant the fleshy tuberous roots 6 in. deep in March.

PROPAGATION: By division of the roots in spring, or seed sown in warm greenhouse in Feb. or March.

SPECIES CULTIVATED: *R. alpina*, pink, summer, 6 in., Himalaya; *cautleoides*, yellow, summer, 12 in., China; *Humeana*, rose-purple, summer, 12 in., W. China; *purpurea*, purple, late summer, 12 in., Himalaya, and var. *pallida*, pale lavender.

Rose, see *Rosa*; **-Acacia**, see *Robinia hispida*; **-Apple**, see *Eugenia Jambos*; **-Bay Willow Herb**, see *Epilobium angustifolium*; **-Box**, see *Cotoneaster microphylla*; **-Campion**, see *Lychnis coronaria*; **-Mallow**, see *Hibiscus*; **-of China**, see *Hibiscus Rosa-sinensis*; **-of Heaven**, see *Lychnis Coeli-rosa*; **-of Jericho**, see *Anastatica hierochuntica*; **-of Sharon**, see *Hypericum calycinum*; **-Root**, see *Sedum rosea*.

Rosemary, see *Rosmarinus*.

Rosinweed, see *Silphium*.

Rosmarinus (Rosemary)—*Labiatae*. Hardy evergreen fragrant shrub. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary well drained. Position, dryish sunny border or shrubbery. Plant, April.

PROPAGATION: By cuttings of half-ripened young shoots in a cold frame in Aug. or Sept.

SPECIES CULTIVATED: *R. officinalis*, violet-blue, May, 4 to 7 ft., S. Europe, with vars. *prostratus*, trailing, rather tender, and *pyramidalis*, upright growth, useful for hedges.

Rosularia—*Crassulaceae*. Evergreen succulent plants, sometimes included in *Cotyledon*.

CULTURE: As *Sempervivum*, but requires protection from snow.

PROPAGATION: As *Sempervivum*.

SPECIES CULTIVATED: *R. pallida* (syns. *Cotyledon chrysantha*, *Sedum chrysanthum*, *Umbilicus chrysanthus*), whitish-yellow, Asia Minor to Himalaya.

Rouge Berry, see *Rivina humilis*.

Roupala—*Proteaceae*. Greenhouse evergreen flowering shrubs. Leaves, simple

or feather-shaped, covered with brownish wool. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous loam, leaf-mould, peat and little sand. Position, large pots or tubs in lofty sunny greenhouse or conservatory. Pot, Feb. or March. Water freely April to Sept., moderately afterwards. No syringing required. Temp., Sept. to March 45° to 50° , March to Sept. 55° to 65° . May stand outdoors in sunny position, June to Sept.

PROPAGATION: By cuttings of firm shoots inserted in pure silver sand in well-drained pots under bell-glass in temp. 55° to 65° , summer.

SPECIES CULTIVATED: *R. elegans*, 6 to 10 ft., Trop. America; *Pohlilii*, 6 to 15 ft., Brazil.

Rowan Tree, see *Sorbus Aucuparia*.

Royal Fern, see *Osmunda regalis*; **-Water-lily**, see *Victoria regia*.

Rubus (Blackberry)—*Rosaceae*. Hardy fruit-bearing and flowering shrubs, perennial plants.

CULTURE OF RASPBERRIES: Soil, deep, rich, moist loam. Rows north to south if possible. Plant, Oct. to March. Distances for planting: Singly, 18 in. apart in the row and 5 ft. between the rows for training to wire trellis; in groups of two canes, 30 in. apart in row and 5 ft. between rows. Pruning: Cut canes off to within 10 in. of ground first year; succeeding years cut off old canes close to ground immediately after fruiting in order to allow young canes to ripen. Reduce the number of young canes at each root or stool to three or four of the strongest. Remove sappy tips of latter in early spring. Apply decayed manure annually in Nov., forking it in 3 in. deep only; on dry soil mulch with strawy manure in April. Water copiously with liquid manure during bearing period. Remove suckers appearing away from base of stools. Avoid deep digging near established plants. Sulphate of potash is an essential manure for this crop and should be applied in autumn at $\frac{1}{4}$ oz. per square yard. Organic nitrogenous manures, such as meat or fish meal, can be applied at 2 oz. per square yard in March.

PROPAGATION: By seeds sown outdoors in a shady border as soon as ripe; division of roots in autumn. Propagate only virus-free strains.

CULTURE OF BLACKBERRIES: Soil, well-drained, deep, rich loam. Position, trained to sunny fences, or in rows in open garden, with shoots trained to a rough trellis. Plant in autumn, strong growers 12 ft. apart. Pruning, cut away shoots that have borne fruit directly after fruiting and remove tips of remaining shoots in March. Top-dress annually in winter.

PROPAGATION: By layering tips in summer, transplanting suckers in autumn; leaf-bud cuttings.

CULTURE OF WINEBERRY, LOGANBERRY AND OTHER HYBRID BERRIES: Soil, as for raspberries. Plant 10 ft. apart in autumn. Shorten shoots well back first season to encourage cane production. Train on fence or wire trellis or place four stakes round each plant at a distance of 3 ft. from the base, and train growths spirally round these. Prune after fruiting, cutting away shoots that have borne fruit and removing soft tips of remaining shoots in March. Top-dress with decayed manure in winter.

PROPAGATION: By layering shoots in summer; dividing the roots in autumn.

CULTURE OF HERBACEOUS SPECIES: Soil, sandy peat. Position, shady rockery. Plant, autumn or spring. Water freely in dry weather.

PROPAGATION: By division in spring.

CULTURE OF SHRUBBY SPECIES: Soil, good ordinary. Position, sunny or shady borders. Plant in Oct. Prune after flowering, cutting away old shoots.

PROPAGATION: By cuttings.

FRUIT-BEARING SPECIES CULTIVATED: *R. flagellaris*, 'American Dewberry', fruit black, Canada, U.S.A.; *idaeus*, 'Raspberry', white, May, berries red or yellow, 3 to 6 ft., Europe; *illecebrosus*, 'Strawberry Raspberry', white, fragrant, fruits scarlet, sour, 5 to 8 ft., E. Asia; *innominatus*, pink, fruit orange-red, to 10 ft., China; *laciniatus*, 'Cut-leaved Blackberry', white or pink, summer, berries

black, 8 to 12 ft.; *loganobaccus*, 'Loganberry', hybrid, origin uncertain, probably a cross between *R. ursinus* and a raspberry, berries deep red, 8 to 12 ft., introduced about 1897 from U.S.A.; *phoenicolasius*, 'Wineberry', pink, summer, berries bright orange-red, 6 ft., China, Japan; *procerus*, 'Himalayan Blackberry', introduced from Germany about 1899, white, berries black, 20 to 40 ft., Europe; *ulmifolius*, 'Evergreen Thornless Blackberry', pink, fruit black, California, var. *inermis*.

HERBACEOUS SPECIES CULTIVATED: *R. arcticus* (syn. *R. stellatus*) mat-forming plant, rose, June, N. America; *Chamemorus* 'Cloudberry', white, 3 to 10 in.

SHRUBBY SPECIES CULTIVATED: *R. acuminatus*, white, Himalaya; *australis*, 'Lawyer Vine', white, pink, or yellow, evergreen, 10 to 20 ft., New Zealand; *biflorus*, flowers inconspicuous, stems waxy white, 8 to 10 ft., spreading, Himalaya, var. *quinqueflorus*, more vigorous; *Cockburnianus* (syn. *R. Giralduus*), purple, 8 to 10 ft., white stems, China; *deliciosus*, 'Rocky Mountain Flowering Raspberry', white, May, 6 to 10 ft., Rocky Mountains; *Henryi*, climbing evergreen, pink, 3 to 6 ft., China, var. *bambusarum*, short-stalked leaflets; *lasiostylus*, purple-rose, July, 6 to 8 ft., Cent. China; *leucodermis*, white, June, 4 to 8 ft., yellowish canes, Western N. America; *odoratus* (syn. *Rubus odoratus*), 'Flowering Raspberry', unarmed, rose-purple, summer, 6 ft., N. America; *spectabilis*, 'Salmonberry', rosy red, May, 6 ft., California.

Ruby Grass, see *Tricholaena rosea*.

Rudbeckia (Coneflower)—*Compositae*. Hardy annuals and herbaceous perennials. First introduced late seventeenth century.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Sow in boxes in cold frame in March, pricking seedlings out when large enough to handle into deeper boxes for hardening off and planting out in May; or sow in open ground where desired to flower in April, thinning the seedlings to 9 in. apart.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny well-drained borders. Plant, Oct., March or April. Mulch with decayed manure annually, Feb. or March. Lift, divide and replant in fresh position triennially.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep outdoors in ordinary soil and sunny position, March or April, transplanting seedlings into flowering positions following autumn; by division of roots, Oct., Feb., March or April.

ANNUAL SPECIES CULTIVATED: *R. amplexicaulis*, yellow and maroon, summer, 1 to 2 ft., N. America; *bicolor*, yellow and maroon, July to Sept., 1 to 2 ft., N. America; *hirta*, 'Black-eyed Susan', yellow and dull brown, summer, 1 to 3 ft., N. America, biennial or annual; *triloba*, deep yellow and brown, summer, 2 to 5 ft., N. America, biennial or annual.

PERENNIAL SPECIES CULTIVATED: *R. californica*, yellow and brown, July to Sept., 4 to 6 ft., California; *fulgida*, yellow and dark purple, July to Sept., 1 to 2 ft., N. America; *laciniata*, yellow, summer, 3 to 6 ft., N. America, var. *portensis*, 'Golden Glow', double; *maxima*, yellow and blackish-brown, late summer, 7 to 9 ft., N. America; *nitida*, yellow, late summer, 4 ft., N. America, var. *Herbstsonne*, 6 ft., golden-yellow, reflexed petals; *speciosa* (syn. *R. Neumannii*), orange-yellow, summer, $1\frac{1}{2}$ to 3 ft., N. America; *subtomentosa*, yellow and purple, late summer, 3 to 5 ft., N. America. See also *Echinacea* and *Lepachys*.

Rue, see *Ruta graveolens*.

Ruellia—*Acanthaceae*. Stove perennial herbs or shrubs. First introduced late nineteenth century.

CULTURE: Compost, equal parts fibrous loam, leaf-mould, peat and silver sand. Pot, Feb. or March. Position, pot in shady part of stove or greenhouse. Water freely March to Oct., moderately afterwards. Syringe twice daily March to Sept., once daily other times. Apply weak stimulants during flowering period to perennial species. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By cuttings inserted in above compost in well-drained pots

under bell-glass or in propagator in temp. 75° to 85° , spring or summer; perennial species by seeds sown in sandy soil in temp. 70° to 75° , Feb. or March.

SPECIES CULTIVATED: *R. Baikiei*, scarlet, winter, 2 to 3 ft., Brazil; *Devosiana*, white, winter, Brazil; *formosa*, scarlet, 2 ft., summer, Brazil; *Herbstii*, purplish-red, September, 3 ft., Brazil; *macrantha*, 'Christmas Pride', rosy purple, winter, to 6 ft., shrubby, Brazil; *Portellae*, rose pink, winter, 1 ft., annual or perennial, Brazil; *solitaria*, purplish-lilac, winter, 2 ft., Brazil; *speciosa*, scarlet, July, to 10 ft., Brazil. See also *Strobilanthes*.

Rumex (Dock; Sorrel)—*Polygonaceae*. Hardy perennial herbs, mostly weeds, but a few grown for greens.

CULTURE OF HERB PATIENCE: Soil, ordinary, moist. Remove flower stems directly they appear and gather leaves frequently.

PROPAGATION: By seeds sown in March, 1 in. deep in drills 18 in. apart, thinning seedlings to 1 ft. apart in row in April; division of roots in March.

CULTURE OF SORREL: Soil, ordinary rich moist. Position, open borders. Plant, 1 ft. apart in rows 15 in. asunder in March. Gather leaves frequently. Remove flower stems. Water freely in dry weather.

CULTURE OF AQUATIC SPECIES: Soil, ordinary. Position, margins of water. Plant in spring. Increased by division in spring.

PROPAGATION: By seeds $\frac{1}{2}$ in. deep in drills 15 in. apart in March, thinning seedlings to 12 in. apart in April; division of roots in March.

SPECIES CULTIVATED: *R. abyssinicus*, 'Spinach-Rhubarb', leaves used as substitute for spinach, stems as rhubarb, 6 ft., Abyssinia; *Acetosa*, 'Sorrel', green, summer, 18 in., leaves edible, Europe (Br.); *Hydrolapathum*, 'Water Dock', 4 to 6 ft., Europe (Br.); *Patientia*, 'Herb Patience', 4 ft., leaves used as substitute for spinach, S. Europe; *scutatus*, 'French Sorrel', 1 to 2 ft., leaves edible, Europe and Asia.

Rupturewort, see *Herniaria*.

Ruschia—*Aizoaceae*. Half-hardy succulent plants, formerly included in *Mesembryanthemum*.

CULTURE: Compost, equal parts old mortar, pounded crocks, sandy loam, well-decayed manure or leaf-mould and sand. Position, well-drained pots in sunny greenhouse or window, may be planted in sunny borders outdoors from June to Sept. Pot, March to May. Water freely April to Sept., keep nearly dry during winter. Temp., March to Oct. 55° to 65° , Oct. to March 40° to 50° .

PROPAGATION: By seed; cuttings in temp. 55° to 65° , March to Sept.

SPECIES CULTIVATED: *R. multiflora* (syn. *Mesembryanthemum multiflorum*), white, Aug., 3 ft., S. Africa; *uncinata* (syn. *M. uncinatum*), red, summer, prostrate, S. Africa.

Ruscus—*Liliaceae* (or *Ruscaceae*). Hardy evergreen shrubs,

CULTURE: Soil, ordinary. Position, shady or sunny shrubberies, borders or woods; useful for dense shade. Plant, Sept., Oct. or April.

PROPAGATION: By suckers; division of roots in spring.

SPECIES CULTIVATED: *R. aculeatus*, 'Butcher's Broom', green, May, 3 ft., Britain; *Hypoglossum*, yellow, inconspicuous, May, to 18 in., S. Europe. The Alexandrian Laurel, frequently known as *Ruscus racemosus*, is correctly *Danae racemosa*, q.v.

Russellia—*Scrophulariaceae*. Stove evergreen flowering shrubs, suitable plants for hanging baskets. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy loam, leaf-mould and silver sand. Position, in light part of stove. Pot, Feb. or March. Water freely April to Sept., moderately afterwards. Prune, Feb. Apply weak stimulants when in flower only. Syringe twice daily April to Oct., except when in flower. Temp., Sept. to March 55° to 65° , March to Sept. 65° to 75° .

PROPAGATION: By cuttings inserted in silver sand in temp. 75° in spring; layering shoots at any time.

SPECIES CULTIVATED: *R. equisetiformis* (syn. *R. juncea*), red, July, 3 to 4 ft., Mexico; *sarmentosa*, red, July, 4 ft., Trop. America. *R. Lemoinei* and *R. elegantissima* are hybrids between the two species.

Russian Vine, see *Polygonum baldschuanicum*.

Ruta (Rue)—*Rutaceae*. Hardy aromatic evergreen shrub. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, in the herb garden or sunny border. Plant, March, 8 in. apart in rows 18 in. asunder or grow naturally as attractive foliage shrub in border; good for chalk soils. Prune the plants closely in April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in drills outdoors in April; cuttings inserted in shady frame, Aug., Sept.

SPECIES CULTIVATED: *R. graveolens*, 'Herb of Grace', yellowish-green, summer, 3 ft., S. Europe.

Rutabaga, see *Brassica Napobrassica*.

Sabal—*Palmae*. Greenhouse fan palms. First introduced early nineteenth century.

CULTURE: Compost, two parts rich loam, one part decayed leaf-mould and sand. Position, well-drained pots in greenhouse or sheltered well-drained beds outdoors in S. of England. Pot, March. Plant, April. Temp., Sept. to March 45° to 55°, March to Sept. 55° to 65°. Water moderately in winter, freely in summer.

PROPAGATION: By seeds sown 1 in. deep in light soil in temp. of 80° in Feb. or March; suckers removed from parent plant in April or Aug.

SPECIES CULTIVATED: *S. Blackburnia*, 20 ft., Bermuda; *minor* (syn. *S. Adansonii*), 3 ft., Southern U.S.A.; *Palmetto*, 'Cabbage Palm', 20 to 40 ft., Southern U.S.A.

Sabatia—*Gentianaceae*. Hardy biennial flowering herb. First introduced mid-nineteenth century.

CULTURE: Soil, equal parts good fibrous loam and finely-sifted leaf-mould and little sand. Position, moist, partially shaded borders or bogs. Sow seeds thinly in April where required to grow, lightly cover with soil, thin to 3 or 4 in. apart when an inch high, to flower following summer; or sow seed $\frac{1}{16}$ in. deep in well-drained pots or shallow pans filled with equal parts sandy peat and leaf-mould; place in a pan partially filled with water and placed in cold frame or greenhouse. Transplant seedlings when an inch high, three in a 2 in. pot, in similar compost, keep in cold frame till following March, then plant out.

SPECIES CULTIVATED: *S. campestris*, rose, summer, 6 to 12 in., N. America.

Saccharum—*Gramineae*. Stove and hardy perennial flowering grasses. Inflorescence, silky, borne in pyramidal panicles, July. Leaves, ribbon-like, green, covered with silky hairs. First introduced late sixteenth century.

CULTURE OF SUGAR CANE: Two parts rich loam, one part leaf-mould or rotted manure and little sand. Position, large pots or tubs in lofty stove. Pot, Feb. or March. Water freely April to Sept., moderately afterwards. Syringe twice daily during spring and summer. Shade from midday sun essential. Temp., March to Oct. 70° to 85°, Oct. to March 55° to 65°.

PROPAGATION: Sugar cane by cuttings of stems inserted in light soil in temp. of 70° to 80° in spring, or by suckers removed in Feb. or March and potted singly in above compost.

SPECIES CULTIVATED: *S. officinarum*, 'Sugar Cane', white, summer, 10 to 15 ft., Tropics, var. *violaceum*, stems violet tinted.

Saccolabium—*Orchidaceae*. An epiphytic genus, so variable that later revisions have made separations under generic names—*Ascocentrum*, *Calceolare*, *Schoenorchis*, *Anota*, *Robiquetia*, *Malleola*. The species given are all well known as *Saccolabiums*. The genus is allied to *Vanda*. Inflorescence axillary, racemose, somewhat clustered, solitary or many flowered.

CULTURE: Compost, as for *Aerides*, temps., etc., similar. As the genus contains hard and softer-leaved species, small and fairly large growing, winter treatment must be slightly varied, then a night temp. of 65° should be given. Winter waterings are required more frequently by the soft-textured species than by the hard, but the compost should never become really dry. In summer a moist warm atmosphere, 70° and more with shading. Liberal watering, exposure to light in autumn, varied. Pans may be used for the dwarf-growing kinds, hung near the glass in winter. Pots or hanging baskets for the larger.

PROPAGATION: The species do not make the tall stems seen in so many *Aerides* and *Vandas*, so that the method of propagation advised for them is very seldom possible. Very occasionally basal growths occur with some and division may then be carefully made.

SPECIES CULTIVATED: A selection—*S. acutifolium* (syn. *S. denticulatum*), greenish-yellow, spotted red-brown, lip white, yellow, spotted crimson, white fringed, summer, Burma, N. India; *ampullaceum*, many small, rose-red, summer, N. India, Burma; *bellinum*, yellow, blotched black-purple, lip white, yellow with a few purple spots, margins white fimbriated, spring, various, Burma; *bigibbum*, yellow, lip whitish, yellow centrally, margin ciliated, Burma; *calcolare*, yellow, lip white, orange-yellow, white fringed, summer, N. India, Burma; *curvifolium*, many, small, cinnabar-red, spur slender, summer, Burma; *gemmaum*, many, small, white and purple, leaves terete, raft, summer, N. India; *giganteum*, fragrant, many, white, purple spotted, lip amethyst-purple, racemes drooping, winter, various, Burma; *Hendersonianum*, small, many, rose-red, spur large, spring, summer, Borneo; *juncifolium*, near *S. gemmaum*, many, small, bluish-violet, lip yellowish, summer, Java; *lanatum*, many, small, purple, yellow, lip pink-white, spikes often branched, downy, summer, autumn, Burma; *longicalcaratum*, many, small, soft rose, spur comparatively long, leaves leathery, summer, Burma; *miniatum*, small, many, orange-red, mid-lobe of lip yellowish, spike erect, spring, Borneo, Java; *Mooreanum*, many, small, rose, rose-purple, tips green, stems drooping, raceme drooped, often branched, autumn, New Guinea; *penangiana*, many, small, yellow, red-brown, whitish, lip white and purple, summer, Penang, Burma; *violaceum*, near *S. giganteum*, many, fragrant, white, spotted amethyst, lip amethyst-purple, scapes drooping, winter, spring, Philippines.

Sadleria—*Polypodiaceae*. Stove tree fern. Fronds, feather-shaped. First introduced late nineteenth century.

CULTURE: Compost, two-thirds peat and loam and abundance of sand. Position, large pots or tubs, well drained, in shady stove or warm conservatory. Repot, Feb. or March. Water moderately Oct. to March, freely afterwards. Syringe trunks daily March to Sept. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°. Shade in summer essential.

PROPAGATION: By spores sown at any time on surface of finely sifted loam and peat in shallow, well-drained pans. Cover with sheet of glass and keep moist in shady position in temp. 75° to 85°.

SPECIES CULTIVATED: *S. cyatheoides*, 5 to 8 ft., Sandwich Islands.

Safflower, see *Carthamus tinctoria*.

Saffron Crocus, see *Crocus sativus*.

Sage, see *Salvia*.

Sagina (Pearlwort)—*Caryophyllaceae*. Hardy perennial evergreen tufted herbs with creeping stems. *S. glabra* is used as a substitute for grass for forming lawns on sandy soils; golden-leaved variety used for carpet bedding.

CULTURE OF *S. GLABRA* ON LAWNS: Soil, sandy. Position, sunny. Plant small tufts 3 in. apart each way in March or April. Keep free from weeds and roll frequently. Requires frequent renewal.

CULTURE OF GOLDEN-LEAVED VARIETY: Soil, ordinary. Position, sunny beds,

borders or rockeries. Plant small tufts in March, 2 in. apart, in lines, designs or masses.

PROPAGATION: By seeds sown in sandy soil in sunny position outdoors in March; division in March or April.

SPECIES CULTIVATED: *S. Boydii*, glossy green tufts, flowers inconspicuous, rare and choice, 1 in., Britain; *glabra*, white, summer, 2 in., Europe; *subulata* (syns. *S. pilifera*, *Spergula pilifera*), densely tufted, flowers white, July to Sept., Corsica, var. *aurea*, leaves marked yellow.

Sagittaria (Arrowhead)—*Alismaceae*. Hardy perennial aquatic herbs.

CULTURE: Compost, two parts strong, rich loam, one part well-decayed manure. Position, borders of open, sunny ponds or lakes for hardy species. Tender species in pots in warm greenhouse, Sept. to May; sunk in borders of ponds outdoors, May to Sept. Depth of water, 6 to 12 in. Plant, March to Oct. Methods of planting: (1) Place plant in small wicker basket containing above compost and lower to the bottom of pond or lake. (2) Enclose roots with soil and large stone in piece of canvas or matting, tie securely, and immerse as above. (3) Place large hillock or mound of compost at bottom of pond when dry and plant roots in centre, afterwards filling with water.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in rich soil in shallow basket and immersed in ponds or lakes in spring; division of plants March or April.

SPECIES CULTIVATED: *S. lancifolia*, white, summer, tender, 2 to 5 ft., America; *latifolia* (syn. *S. variabilis*), 'Duck Potato', white, summer, 2 to 3 ft., N. America; *montevidensis*, white and purple, summer, 4 to 6 ft., tender, S. America; *natans* (syn. *S. pusilla*), for aquariums, white, 5 in., N. America; *sagittifolia*, white and purple, summer, 2 ft., Europe (Br.), and var. *flore-pleno*, double; *subulata*, aquarium carpeter, 3 in., N. America.

Sago Fern, see *Cyathea medullaris*; -**Palm**, see *Cycas*.

St. Augustine's Grass, see *Stenotaphrum secundatum*.

St. Bernard's Lily, see *Anthericum Liliago*.

St. Bruno's Lily, see *Paradisea Liliastrum*.

St. Dabeoc's Heath, see *Daboecia polifolia*.

St. John's Wort, see *Hypericum*.

Saintpaulia—*Gesneriaceae*. Warm greenhouse perennial. First introduced late nineteenth century.

CULTURE: Compost, equal parts of loam, leaf-mould, peat and sand. Pot, Feb. to May. Pots, 3 in. for small and $4\frac{1}{2}$ in. for large plants, well drained. Water freely from April to Sept., moderately afterwards. Apply weak liquid manure occasionally during flowering season. Temp., Oct. to April 55° to 60°, April to Oct. 65° to 75°.

PROPAGATION: By seeds; leaf cuttings.

SPECIES CULTIVATED: *S. diplotricha* (syn. *S. kewensis*), violet, summer, 3 to 4 in., Trop. Africa; *ionantha*, 'African Violet', violet, June to Oct., 3 to 4 in., Cent. Africa, and vars. *albescens*, white, *purpurea*, purple, and *violescens*, deep violet; *pusilla*, bluish-violet, summer, 3 to 6 in., Trop. Africa; *tongwensis*, violet, summer, N.E. Tanganyika, E. Africa.

Salix (Willow)—*Salicaceae*. Hardy deciduous trees and shrubs, many natives of Britain. Shoots more or less drooping, dioecious flowers and yellow, purple, red, orange or whitish bark.

CULTURE OF ORNAMENTAL SPECIES: Soil, ordinary heavy or moderately heavy; light soils are not suitable. Position, damp, near margins of ponds, etc., for all species. Plant, Oct. to March. Prune, Nov. to Feb.

TIMBER CULTURE: Goat Willow is suitable for damp coppices, its wood being valuable for hoops, poles, crates, etc. White or Huntingdon Willow also suitable for damp soils, coppices, etc.; branches used for making scythe and rake handles,

timber for lining carts and barrows. Wood of the Bat Willow used for making cricket bats. Plant in autumn. February is the time to pollard willows. Weight of timber per cubic foot, 33 lb.

PROPAGATION: By cuttings of shoots or stems of any age or size in moist soil, Oct. to March; choice kinds by budding on *S. caprea* in July, bandaging the bud with damp moss; or by grafting on a similar stock in March.

SPECIES CULTIVATED: *S. alba*, 'White Willow', 'Huntingdon Willow', 50 to 60 ft., Britain, Asia, N. Africa, vars. *calva* (syn. *S. caerulea*), 'Bat Willow', *sericea*, 'Silver Willow', *vitellina*, 'Golden Willow', *vitellina pendula*, 'Golden Weeping Willow'; *babylonica*, 'Weeping Willow', 30 to 50 ft., China; *Bockii*, 3 to 4 ft., W. China; *Caprea*, 'Goat Willow', 'Sallow', 15 to 20 ft., Britain, var. *pendula*, 'Kilmarnock Willow'; *daphnoides*, 'Violet Willow', 30 to 40 ft., shoots covered with plum-coloured bloom, Britain, Europe, Asia; *discolor*, 'Pussy Willow', to 20 ft., N. America; *fragilis*, 'Crack Willow', 60 to 70 ft., shoots yellow and brown, Britain, Europe, N. Asia; *herbacea*, 'Dwarf Willow', to 1 ft., Britain, Temp. Zone; *irrorata*, attractive white stems, red catkins, 8 to 10 ft., Colorado to N. Mexico; *lanata*, 2 to 3 ft., N. Europe, Britain; *magnifica*, 6 to 20 ft., W. China; *Matsudana*, pyramidal tree to 40 ft., good for dry soils, N. China, vars. *pendula*, weeping, and *tortuosa*, 'Corkscrew Willow', spirally twisted leaves and branches; *Medemii*, large and early catkins, 12 to 18 ft., Armenia, Persia; *Medwedewii*, slender leaves, glabrous, 8 to 12 ft., Asia Minor; *nigra*, 'Black Willow', dark brown, rough scaly bark, to 35 ft., N. America; *pentandra*, 20 to 50 ft., Britain, Europe, N. Asia; *purpurea*, 'Purple Osier', shoots reddish-purple, 10 to 18 ft., Britain; *repens*, 'Creeping Willow', to 3 ft., Britain, Europe, Asia; *reticulata*, 6 to 12 in., Britain, Labrador; *retusa*, 4 to 8 in., Europe; *viminalis*, 'Osier Willow', the species grown to yield osiers, 12 to 20 ft., Europe, N. Asia.

Sallow, see *Salix Caprea*.

Salmonberry, see *Rubus spectabilis*.

Salpiglossis—*Solanaceae*. Half-hardy annual. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, sandy loam or good ordinary rich. Position, sunny beds or borders. Sow seeds in well-drained pots, pans, or shallow boxes filled with compost of equal parts loam, leaf-mould and sand placed in temp. of 55° to 60° in April. Cover seeds with thin sprinkling of fine soil. Transplant seedlings when three leaves have formed $\frac{1}{2}$ in. apart in well-drained pots or shallow boxes of above compost. Keep in temp. of 55° till May, then place in cold frame to harden and plant out in early June. Water freely in dry weather. Apply weak stimulants occasionally.

INDOOR CULTURE: Compost, four parts sandy loam, half a part each of leaf-mould and decayed cow manure and silver sand. Sow seeds as advised above for summer flowering; in July and Aug. for spring flowering. Transplant seedlings when three leaves have formed, one in a 2½ in. pot, and place on shelf close to glass in temp. 55° to 65°. When well rooted in small pots shift into 5 or 6 in. size. Water moderately until plants are well established. Nip off points of main shoots when 6 in. high to induce bushy growth. Place in cool greenhouse or window whilst in bloom.

SPECIES CULTIVATED: *S. sinuata*, 'Scalloped Tube Tongue', various colours, 2 ft., Chile, parent of the beautiful strains grown in gardens.

Salsify, see *Tragopogon porrifolius*.

Salt Bush, see *Atriplex*; **-Tree**, see *Halimodendron*.

Salvia (Sage)—*Labiatae*. Greenhouse, hardy and half-hardy annuals, herbaceous perennials and evergreen shrubs.

CULTURE OF ANNUAL SPECIES: Soil, ordinary rich. Position, sunny borders for hardy kinds.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts loam and decayed

manure, little sand. Position, greenhouse, Sept. to June; cold frame or sheltered position outdoors, June to Sept. Pot, March. Water freely March to Oct., moderately afterwards. Apply stimulants occasionally a month after repotting until flowers expand, then cease. Temp., Sept. to March 45° to 55°, March to June 55° to 65°. Cut down shoots to within 3 in. of their base after flowering. Plant rooted cuttings singly in 3½ in. pots. Nip off points of main shoots, also of succeeding shoots when 3 in. long. Shift into 5 or 6 in. pots when former pots are filled with roots. Water freely. Apply stimulants occasionally.

OUTDOOR CULTURE: Soil, rich ordinary. Position, sunny sheltered beds or borders. Plant, June. Lift in Sept., place in pots to flower in greenhouse in autumn. Water freely in dry weather. Apply stimulants occasionally. Lift tuberous roots of *S. patens* in Oct. and store in sand in frost-proof place. Start in heat in March and plant out in May.

CULTURE OF HARDY SPECIES: Soil, ordinary rich. Position, sunny border. Plant, Oct., Nov., March or April. Mulch annually with decayed manure in March. Cut down stems close to ground in Oct. Lift, divide and replant every third year.

CULTURE OF CLARY: Hardy biennial. Leaves used for flavouring soups. Used as border plant also. Soil, ordinary. Position, sunny. Sow seeds 1 inch deep in drills 18 in. apart in April. Thin seedlings when 2 in. high to 12 in. apart in row. Gather leaves in summer and dry for use following year.

CULTURE OF SAGE: Soil, ordinary rich, light, dryish. Position, sunny. Plant, March or April, 12 in. apart in rows 18 in. asunder. Nip off points of shoots first year to induce bushy growth. Water freely in dry weather first year after planting. Renew plantation every four years, as shrubs are inclined to become leggy with age.

PROPAGATION: Greenhouse species by cuttings 2 to 3 in. long of young shoots inserted in sandy soil in temp. 65° in spring. The popular vars. of scarlet salvia (*S. splendens*), although perennial, may be flowered in the first season from seed sown in Jan., Feb. or March in gentle heat, or grown on in pots for planting out in June; the blue *S. patens* may be similarly treated. Sage by seeds sown in 55° to 65° in March, transplanting seedlings outdoors in May or June, or by cuttings in a shady border or cold frame in April; miscellaneous hardy species by division in March or April. Annuals by seed.

GREENHOUSE SPECIES CULTIVATED: *S. azurea*, blue, winter, 6 ft., N. America; *caerulea*, blue, winter, 2 to 3 ft., S. Africa; *coccinea*, scarlet, autumn, 2 to 3 ft., N. America; *farinacea*, violet-blue, summer, 3 ft., Mexico; *fulgens*, scarlet, summer, 2 to 3 ft., Mexico; *Grahamii*, scarlet, July to Oct., 4 ft., Mexico; *Greggii*, carmine, Aug. to Nov., 3 ft., Mexico; *Heeri*, scarlet, winter, 2 to 3 ft., Peru; *interrupta*, violet-blue, winter, 3 to 4 ft., Morocco; *involucrata*, crimson, autumn, 3 to 4 ft., Mexico; *leucantha*, white, winter, 2 ft., Mexico; *patens*, blue, summer, 2 to 3 ft., Mexico; *rutilans*, red, winter, 2 to 3 ft., origin uncertain; *Sessei*, scarlet, winter, 4 to 5 ft., Mexico; *splendens*, scarlet, autumn, 2 to 3 ft., Brazil.

HARDY SPECIES CULTIVATED: *S. argentea*, white, foliage silvery, summer, 3 ft., Medit. Region; *bicolor*, bluish-violet and white, summer, 3 ft., Spain and N. Africa; *Bulleyana*, yellow, June, July, 2 ft., Himalaya; *dichroa*, blue and white, summer, 4 to 6 ft., N. Africa; *farinacea*, violet-blue, July, Aug., 3 ft., Texas; *fulva*, red, requiring sheltered position, July, 2½ ft., Mexico; *glutinosa*, pale yellow, July to Sept., 3 ft., Europe; *grandiflora* (syn. *S. Pitcheri*), sky blue, summer, 3 ft., Mexico; *nutans*, blue, July, 2 ft., S.E. Europe; *officinalis*, 'Sage', blue, shrubby, summer, 3 ft., S. Europe; *pratensis*, 'Meadow Sage', violet, May, 3 ft., Britain; *Sclarea*, 'Clary', bluish-white, summer, 2 ft., Medit. Region; *uliginosa*, azure blue, Aug. to Sept., 3 to 5 ft., Brazil.

ANNUAL SPECIES CULTIVATED: *S. carduacea*, half-hardy, lilac-blue, summer, 1 ft., California; *coccinea*, half-hardy, scarlet, autumn, 2 to 3 ft., N. America; *Horminum*, lilac, to purple, summer, 1½ ft., S.E. Europe.

Salvinia—*Salviniaceae*. Tender, floating, flowerless, annual aquatics. Rounded leaves, arranged in pairs and covered with silky hairs.

CULTURE: Soil, not necessary. Position, tanks or water in warm greenhouse or in indoor aquariums. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 60°. Place in tanks any time.

PROPAGATION: By division during growing period. It is advisable to keep stock pans containing 3 in. sifted loam and charcoal and 1 in. of water; spores will drop into mud and keep the stock going.

SPECIES CULTIVATED: *S. auriculata* (syn. *S. brasiliensis*), pea-green foliage, Trop. America; *natans* (trade name), small, bright green, warm temp. regions excluding America.

Sambucus (Elder)—*Caprifoliaceae*. Hardy deciduous shrubs or small trees and, rarely, herbaceous perennials. Green, golden or white pinnate leaves, and black or scarlet berries which are extensively used in country districts for medicinal beverages and wines.

CULTURE: Soil, ordinary. Position, open shrubbery or hedgerows for common species; moist, sunny borders for variegated kinds, dry banks or shrubberies for herbaceous species. Plant, Oct. to March. Prune into shape, Nov. to Jan. Nip off points of young shoots of golden and silver elders during summer, also cut shoots closely back in March to ensure dwarf growth and rich colouring in foliage.

PROPAGATION: By cuttings, herbaceous species by division.

SPECIES CULTIVATED: *S. canadensis*, white, July, to 12 ft., Eastern N. America, and var. *acutiloba*, leaves deeply dissected; *Ebulus*, 'Dwarf Elder', herbaceous, white, tinged pink, summer, 3 ft., Europe; *nigra*, 'Common Elder', white, June, 20 ft., Britain, and vars. *aurea*, 'Golden Elder', *laciniata*, 'Cut-leaved Elder', *rosea flore-pleno*, flowers double, rosy tinted; *racemosa*, white, April, scarlet berries in summer, 8 to 12 ft., Europe, and vars. *plumoso-aurea*, toothed foliage golden-yellow, *tenuifolia*, leaflets finely dissected.

Samolus (Tasmanian Water Pimpernel)—*Primulaceae*. Hardy herbaceous perennial. First introduced early nineteenth century.

CULTURE: Soil, sandy peat. Position, moist bog or rockery. Plant, March or April. Water freely in dry weather in summer.

PROPAGATION: By division of the roots in spring.

SPECIES CULTIVATED: *S. repens*, white, Aug., 6 in., Australia.

Samphire, see *Crithmum maritimum*.

Sanchezia—*Acanthaceae*. Stove flowering shrub. First introduced mid-nineteenth century.

CULTURE: Compost, two parts peat and loam, one part decayed manure and sand. Position, light part of stove in winter; shady part in spring and summer. Pot, March. Syringe twice daily April to Oct., once daily afterwards. Water freely March to Oct., moderately other times. Apply weak stimulants occasionally during summer. Temp., Sept. to March 55° to 65°, March to Sept. 75° to 85°.

PROPAGATION: By cuttings of young shoots inserted under bell-glass in fine soil, March to July.

SPECIES CULTIVATED: *S. nobilis*, yellow and red, March to Oct., 3 to 4 ft., Ecuador, and var. *variegata*, leaves striped white or yellow.

Sand Lily, see *Leucocrinum montanum*; **-Myrtle**, see *Leiophyllum*; **-Verbena**, see *Abronia*; **-wort**, see *Arenaria*.

Sandersonia—*Liliaceae*. Stove climbing tuberous-rooted herb. First introduced mid-nineteenth century.

CULTURE: Compost, sandy loam with a little leaf-mould and well-decayed manure. Position, well-drained pots, with shoots trained to roof or trellis. Pot, Feb., placing tubers 2 in. deep, one in a 6 in. pot or several in an 8 or 12 in. pot. Water moderately till growth is well advanced, then freely. After flowering gradually withhold water and keep soil quite dry till potting time. Temp., Feb. to Sept. 70° to 85°, Sept. to Feb. 55° to 65°.

PROPAGATION: By seeds inserted singly, $\frac{1}{4}$ in. deep, in 3 in. pots filled with light

soil in temp. 75° in Feb. or March; offsets removed from large tubers at potting time.

SPECIES CULTIVATED: *S. aurantiaca*, orange-yellow, July and Aug., 3 to 6 ft., Natal.

Sanguinaria—*Papaveraceae*. Hardy perennial low-growing herb with red juice. First introduced late seventeenth century.

CULTURE: Soil, sandy loam or peat. Position, sunny borders or rockeries. Plant, Oct., Nov., March or April. Water freely in dry weather. Top-dress annually with decayed cow manure in Feb. or March. Should be interfered with as little as possible.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in equal parts leaf-mould, peat and sand in cold frame or cool greenhouse in early autumn or spring, transplanting seedlings outdoors when large enough to handle; division of roots in Oct. or March.

SPECIES CULTIVATED: *S. canadensis*, 'Bloodroot', white, early spring, 6 in., N. America, and var. *multiflora*, double flowers.

Sanguisorba (Burnet)—*Rosaceae*. Hardy perennial herbs, sometimes known as Poterium.

CULTURE: Soil, ordinary. Position, sunny or shady borders or by waterside. Appreciate abundant moisture during growing season. Plant, Oct. to Nov. or March to April.

PROPAGATION: By seed sown in pans in sandy soil during Feb. or March; division of roots in March or April.

SPECIES CULTIVATED: *S. canadensis* (syn. *Poterium canadense*), white, July to Sept., 4 ft., N. America; *obtusifolia* (syn. *Poterium obtusum*), pink, July to Sept., 2 to 3 ft., Japan, var. *alba*, white.

Sansevieria (Bowstring Hemp; Angola Hemp)—*Liliaceae*. Stove herbaceous perennials. Flowers, white, green, yellowish; insignificant. Leaves, narrow, ridged, green, long, margined or spotted with white. First introduced late seventeenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, pots in shady part of stove. Pot, Feb. to April. Water copiously March to Oct., moderately afterwards. Syringe freely in summer. Temp., March to Sept. 65° to 75°, Sept. to March 55° to 65°.

PROPAGATION: By division of plants, Feb. to April.

SPECIES CULTIVATED: *S. cylindrica*, white, Aug., 2½ to 5 ft., leaves banded dark green, Trop. Africa; *thyrsiflora* (syn. *S. guineensis*), greenish-white, Sept., 1 to 1½ ft., leaves banded pale green, S. Africa; *trifasciata* var. *Laurentii*, greenish-white, 2 ft., leaves striped golden yellow, W. Trop. Africa; *zeylanica*, greenish-white, 2 to 2½ ft., leaves banded light green, Ceylon.

Santolina (Lavender Cotton)—*Compositae*. Greyish evergreen aromatic shrubby plants. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary sandy. Position, sunny borders or rockeries. Plant, Sept., Oct., March or April. *S. Chamaecyparissus* is one of the most useful of grey-foliaged shrubs, but requires annual hard pruning in spring to prevent legginess.

PROPAGATION: By cuttings of shoots, 2 to 3 in. long, pulled off with portion of stem attached and inserted in pots of sandy soil in cold frame, Sept. or Oct., or in sheltered position outdoors same time.

SPECIES CULTIVATED: *S. Chamaecyparissus* (syn. *S. incana*), yellow, July, 1 to 2 ft., S. Europe, leaves covered with cottony-grey down; *virens*, 'Holy Flax', yellow, summer, 2 ft., leaves green, S. Europe.

Sanvitalia—*Compositae*. Hardy annual. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, margins of sunny borders or rockeries. Sow seeds $\frac{1}{8}$ in. deep in light soil in cool temp. in March. Harden off seedlings in cold frame in April and plant outdoors in May; or in lines or patches in open

ground end of April, thinning seedlings when 1 in. high to 4 or 5 in. apart. Water freely in dry weather and apply weak stimulants occasionally.

SPECIES CULTIVATED: *S. procumbens*, yellow and purple, summer to late autumn, trailing, Mexico, var. *flore-pleno*, flowers double.

Sapodilla, see *Sapota Achras*.

Saponaria (Soap-wort)—*Caryophyllaceae*. Hardy annuals and perennials. First introduced late sixteenth century.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, margins of sunny borders or in beds. Sow seeds in lines or patches $\frac{1}{8}$ in. deep in April for summer flowering; in Sept. for spring flowering. Thin seedlings when 1 in. high to 2 or 3 in. apart. Water freely in dry weather and apply stimulants occasionally.

CULTURE OF PERENNIAL SPECIES: Soil, deep, rich loam. Position, sunny rockeries or borders for *S. ocymoides*; large, sunny or shady shrubbery borders or wild garden for *S. officinalis*. Plant, Oct. to April. Top-dress annually in Feb. with decayed manure. Water freely in dry weather.

PROPAGATION: Perennial species by seeds sown in shallow boxes of sandy soil in temp. of 55° in March, hardening seedlings in a cold frame in April, and planting out in May or June; or outdoors in April, transplanting seedlings in June and July; by cuttings inserted in sandy soil in cold frame, Sept. to Oct.; division of roots, Oct. to March.

ANNUAL SPECIES CULTIVATED: *S. calabrica*, rose, July to Sept., 6 to 12 in., Italy; *Vaccaria*, pink, summer, 2 to 3 ft., Europe, and var. *alba*.

PERENNIAL SPECIES CULTIVATED: *S. bellidifolia*, pale yellow, June to Aug., 9 to 12 in., E. Europe; *caespitosa*, rose, June to Aug., 4 in., Pyrenees; *lutea*, yellow, June to Aug., 3 to 6 in., Europe; *ocymoides*, 'Rock Soap-wort', rosy purple, summer, trailing, Europe; *officinalis flore-pleno*, 'Bouncing Bet', 'Fuller's Herb', pink, Aug., 2 to 3 ft., Europe (Br.).

Sapota—*Sapotaceae*. Tender evergreen tree cultivated in the tropics for its fruit. The milky latex is the chief source of Gum Chicle, which, flavoured, is 'chewing gum'.

CULTURE: Compost, fertile sandy loam. Position, border in warm greenhouse.

PROPAGATION: By seeds; shield budding on common seedling stocks; grafting and layering are methods also used in India.

SPECIES CULTIVATED: *S. Achras* (syn. *Achras Sapota*), 'Sapodilla', white, fruit brown, with yellow-brown translucent flesh and black shining seeds, to 75 ft., Trop. America.

Sapote, see *Achras Zapota*.

Sarcanthus—*Orchidaceae*. A large variable epiphytic genus. On the whole, of little horticultural value. Stems leafy, erect or pendent, varying in size, flowers often many, small, fleshy, racemes simple or branched. Species are met with in cultivation and a few have prettily coloured flowers.

CULTURE: As suggested for *Saccolabiums*, requiring the same consideration in winter for watering. The longer-stemmed forms require support.

PROPAGATION: The remarks under *Saccolabium* apply.

SPECIES CULTIVATED: A selection—*S. chrysomelas*, small, many, yellowish, with dark purplish centres to the sepals and petals, summer, Burma; *erinaceus*, dwarf, many, small, white to pink, lip deep rose, pretty, summer, Burma; *filiformis*, small, purplish, lip yellowish and rose, stems pendulous, long, leaves terete, summer, autumn, Burma, Siam; *hongkongensis*, many, small, lilac, lip purple, leaves terete, Hong Kong; *ornithorhynchus*, dwarf, many, small, yellowish, rose-purple centrally, lip amethyst-purple, pretty; *pallidus*, many, small, in a panicle, purplish-brown, margined yellow, lip white, various, India, Burma; *paniculatus*, many, small, yellowish, with one or two brown-red central stripes, various, China, Burma; *Williamsonii*, many, small, pink-lilac, lip lilac and amethyst, raceme often branched, leaves terete, pretty, summer, Andamans, Burma.

Sarcochilus—*Orchidaceae*. A large genus of epiphytic orchids. Pseudo-bulbs are absent, stems long or short, flowers usually racemose and small. There is great variation and many species are of no horticultural importance.

CULTURE: Compost, similar to that given *Saccolabium*, cultivation much the same. The temp. for tropical species as for *Saccolabium* and *Phalaenopsis*. The cooler-growing species, chiefly from Australia, succeed during summer in the Odontoglossum House but generally need a temp. of 60° and moist atmosphere in winter. Species with hard-textured leaves need less frequent watering in winter. Leafless species are known and they require a more decided rest.

PROPAGATION: As for *Vandas* but can seldom be effected.

SPECIES CULTIVATED: A selection—*S. Berkeleyi*, creamy white, lip with purple stain, stems short, raceme pendulous, summer, Nicobar Islands; *Ceciliae*, fragrant, few small pink, lip with white hairs, summer to autumn, Australia; *falcatus*, 3 to 10 fragrant whitish, lip with red and orange, spring, Australia; *Fitzgeraldii*, up to 12 comparatively large, white spotted red, lip spotted rose-purple, spring, Australia; *Hartmannii*, white spotted dark red, lip streaked red-purple, mid-lobe often yellowish, spring, Australia; *luniferus*, stem absent, leaves absent or fugitive, roots long, flowers yellow, spotted red, lip yellow, barred white or brown, spring to summer, N. India, Burma; *unguiculatus*, fragrant, creamy white or yellowish, lip streaked red, mid-lobe dotted crimson, flowers fugacious but borne in succession, summer, Philippines.

Sarcococca (Sweet Box)—*Buxaceae*. Hardy evergreen shrubs, fragrant unisexual flowers without petals produced in winter and early spring. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, moist and shady, thrives well under trees. Plant, Sept. to Oct. and April to May.

PROPAGATION: By cuttings of ripened wood in sandy soil in cold frame during Sept. to Oct.

SPECIES CULTIVATED: *S. confusa*, white, fruits black, winter, up to 6 ft., origin unknown, probably China; *Hookeriana*, white, fruits black, winter, 2 to 3 ft., Himalaya; *humilis*, white, fruits black, winter, 2 ft., Cent. China; *ruscifolia*, white, fruits red, winter, to 4 ft., China; *saligna*, greenish, scentless, 4 to 5 ft., N. India, Himalaya.

Sarmienta—*Gesneriaceae*. Greenhouse evergreen creeper. First introduced mid-nineteenth century.

CULTURE: Compost, soft peat, charcoal and chopped sphagnum moss. Position, teak baskets or pans suspended from roof, or in pots with shoots growing up stems of dead tree ferns. Pot or plant, March. Water copiously April to Oct., moderately afterwards. Syringe freely daily March to Oct. Shade from sun. Temp., March to Sept. 60° to 70°, Sept. to March 45° to 55°.

PROPAGATION: By division of plants in March.

SPECIES CULTIVATED: *S. repens*, 'Chilean Pitcher Flower', scarlet, creeping, summer, Chile.

Sarracenia (Pitcher-plant)—*Sarraceniaceae*. Half-hardy herbaceous perennials with tubular, pitcher-shaped, reticulated leaves. First introduced mid-eighteenth century.

INDOOR CULTURE: Compost, equal parts fibrous peat and chopped sphagnum moss with a little sifted loam and silver sand. Position, cool, moist corner of greenhouse or fernery, cold frame, or wardian case in dwelling-room. *S. flava* and *S. purpurea* are hardy grown under sheltered conditions in S. England. Pot, March. Pots to be two-thirds full of drainage. Place pot containing plant inside another pot two sizes larger and fill space between with sphagnum moss. Water freely April to Oct., very little in winter. Syringe foliage gently daily in summer. Shade from bright sun.

OUTDOOR CULTURE OF S. FLAVA AND S. PURPUREA: Compost, equal parts peat and sphagnum moss. Position, fully exposed bog garden or moist rockery. Plant,

March or April. Keep surface of soil covered with layer of moss. Water freely in summer and cover with frame-light in winter.

PROPAGATION: All the species and hybrids by division in March or April.

SPECIES CULTIVATED: *S. Drummondii*, flowers purple, June, leaves white, green, and purple, 2 ft., N. America; *flava*, 'Huntsman's Horn', yellow, June, 2 ft., N. America; *minor* (syn. *S. variolaris*), flowers yellow, leaves spotted with white, N. America; *psittacina*, flowers purple, leaves veined red or purple, N. America; *purpurea*, 'Huntsman's Cup', 'Indian Cup', 'Sidesaddle Flower', leaves veined purple, N. America; *rubra*, flowers reddish, leaves veined purple, N. America. There are many hybrids.

Sarsaparilla, see *Smilax*.

Sasa—*Gramineae*. Bamboo-like shrubs. Formerly included in *Arundinaria* and *Bambusa*.

CULTURE: Soil, loam, leaf-mould and sand. Position, sheltered shrubberies or massed on lawns.

PROPAGATION: By division in April and May.

SPECIES CULTIVATED: *S. chrysantha* (syns. *Arundinaria* and *Bambusa chrysantha*), to 6 ft., slightly variegated, Japan; *Veitchii* (syns. *S. albo-marginata*, *Arundinaria* and *Bambusa Veitchii*), 3 ft., quick growing, Japan.

Sassafras—*Lauraceae*. Hardy deciduous aromatic tree grown for the foliage.

CULTURE: Soil, deep loam, situation sheltered. Plant, Oct. or March.

PROPAGATION: By imported seeds sown in well-drained pots in cold frame, March.

SPECIES CULTIVATED: *S. albidum* (syn. *S. officinale*), greenish-yellow, round, dark blue fruits, May, 50 to 70 ft., Eastern U.S.A.

Satin flower, see *Lunaria*; **-leaf**, see *Chrysophyllum oliviforme*; **-Poppy**, see *Meconopsis Wallichii*.

Satureja (Savory)—*Labiatae*. Hardy annual and perennial aromatic herbs and sub-shrubs. Some authors place certain species in a separate genus, *Calamintha*.

CULTURE: Soil, ordinary. Position, sunny rockeries or borders. Plant, Oct. or April.

PROPAGATION: Annuals by seed; perennials, division or cuttings of young shoots; shrubby species by cuttings.

SPECIES CULTIVATED: *S. Acinos* (syn. *Calamintha Acinos*), purple-blue, July, 6 in., annual, Europe; *alpina* (syn. *C. alpina*), purple, June, 6 in., Europe; *Calamintha* (syns. *C. officinalis*, *Clinopodium Calamintha*), 'Calamint', lilac, June, 1 to 2 ft., Europe; *grandiflora*, purple, June, 1 ft., Europe; *hortensis* (syn. *C. hortensis*), 'Summer Savory', pink, 1½ ft., annual, Europe; *intricata*, white, summer, tufted perennial, Spain; *montana* (syns. *S. cuneifolia*, *illyrica* and *pygmaea*, *C. montana*), 'Winter Savory', white, 15 in., Europe, Asia; *rupestris*, flowers in dense whorls, sub-shrub, S.E. Europe.

Sauromatum (Monarch of the East)—*Araceae*. Half-hardy perennial with tuberous roots and arum-like flower spathes. First introduced early nineteenth century.

CULTURE: Purchase tubers in autumn, place them in a dry saucer in a warm room, and in a few weeks the flower spathe will appear. No soil or water needed. After flowering plant the tuber in a moist place outdoors to make its leaf growth. Lift in Aug., keep in a cool place, and again place in a saucer indoors. Repeat the operation year by year.

SPECIES CULTIVATED: *S. guttatum*, purple, yellow, and green, winter or spring, 1½ to 2 ft., Cent. Asia.

Saururus (Lizard's Tail)—*Saururaceae*. Hardy aquatic perennials. First introduced mid-eighteenth century.

CULTURE: Soil, heavy loam with peat and leaf-mould. Position, margins of ponds. Plant, April to May.

PROPAGATION: By division at planting time.

SPECIES CULTIVATED: *S. cernuus*, 'American Swamp Lily', white, fragrant, summer, 1 to 2 ft., N. America; *chinensis* (syn. *S. Loureirii*), yellowish-white, summer, 1 to 2 ft., China, Japan.

Saussurea—*Compositae*. Hardy perennial herbs. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny rockeries. Plant, Oct., Nov., March or April.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in ordinary soil in sunny position outdoors, April, transplanting seedlings when three or four leaves have formed.

SPECIES CULTIVATED: *S. alpina*, purple, Aug., 6 in., Northern and Arctic Regions (Br.); *pygmaea*, purple, July, 4 in., Europe.

Savin, see *Juniperus Sabina*.

Savory, see *Satureja*.

Savoy, see *Brassica oleracea* var. *capitata*.

Saxifraga (Saxifrage; Rockfoil)—*Saxifragaceae*. A genus of about 300 species and as many hybrids. Mostly hardy perennial, rarely annual. Natives, generally alpine, north and south temperate and arctic zones and Asia, and very rare in S. America, absent from Australia, S. Africa and Southern Pacific. Flowers white, yellow, purple, pink or red, paniculate or corymbose. A dozen species are indigenous to Britain.

CULTURE: With few exceptions Saxifrages are among the easiest of plants to grow. As cultivation differs according to various sections, it is dealt with in each section.

PROPAGATION: By offsets or division of tufts, but some, especially hybrids of *Kabschia* and *Engleria* sections, are best increased by means of tiny cuttings rooted in a cold frame in a mixture of five parts sand to three parts finely-sieved moss peat; the cuttings should be taken as soon as the growths are long enough to handle after flowering in spring or early summer; also by seeds.

The genus falls botanically into fifteen sections and one sub-section (*Engleria* of horticulture equals sub-section *Media* of *Kabschia* section). These sections are numbered 1 to 16 and the section number appears in parentheses after each name in the list of species, and reference to the particular section will supply simple cultural needs of plants belonging to it. In so widely diverse a genus it is not possible in a limited space to give more than a broad general indication of the conditions preferred by each section:

1. **Boraphila**. All leaves at base forming a few-leaved, softly leathery rosette. Flowers in spikes or loose showers, white or spotted. Generally prefer cool or damp places and peaty soil.
2. **Hirculus**. Undivided, deciduous, oval leaves, mat, not rosette forming. Flowers yellow or orange on leafy stems. Require bog or damp scree conditions.
3. **Robertsonia**. More or less spoon-shaped, leathery leaves, entire, but variously toothed at margins. Mostly in basal rosettes. Flowers in loose, open showers, small, white, pink or spotted. All very easily grown in shady or slightly moist positions.
4. **Miscopetalum**. Tufted plants with leathery, round to oval leaves, stalked, and with variously-toothed margins. Stems upright and more or less leafy ending in open panicles of small, mostly white, but sometimes spotted flowers frequently having uneven petals. Shade lovers.
5. **Cymbalaria**. Small, freely-branching annuals with roughly ivy-shaped leaves and golden, or rarely white, star-shaped flowers. Cool shady spots for preference.
6. **Tridactylites**. Mostly unimportant annual or biennial plants with basal

rosettes of flimsy, undivided to three-pointed, leaves. More or less leafy, branching stems carry the small white flowers. Poor sandy soil in sun or shade.

7. **Nephrophyllum.** Deciduous plants, often bearing bulbils at the base or in the leaf axils of the flowering stems. Leaves mostly kidney-shaped of lax texture and variously marginally toothed. Flowers generally white.
8. **Dactyloides.** All the so-called 'Mossy' Saxifrages belong to this group. All form more or less dense carpets or mats of rosettes of variously-cleft hairy or glabrous leaves. The freely-produced flowers may be white, pink, rose or deep red, or any intervening shade. Happiest away from scorching sun.
9. **Trachyphyllum.** Mostly small, mat-forming species with narrow, undivided, bristle-edged and pointed leaves. Flowers borne on sparsely branching stems, usually about 4 in. high. They are dingy white, pale, or almost orange-yellow. In nature seem to prefer lime-free positions.
10. **Xanthizoon.** This section embraces the many forms of *S. aizoides*, which is found all over the Northern Hemisphere with the exception of Asia. Loose mats of tangled stems set sparsely with narrow leaves which are scarcely rosetted. Leaves undivided but may be slightly notched or bristly at the margins. Flowers produced singly or in loose cymes, varying from pale and rich yellow to orange or even purple and deep red. In nature prefer shingly water margins but are tolerant of far less moist conditions in cultivation.
11. **Euaizoonia.** Contains all the broader-leaved, silver-encrusted species from *S. aizoon* to *S. longifolia*. All form rosettes which generally surround themselves with offset rosettes, forming clumps or cushions. All have tall, more or less branching, flower stems which are loosely or densely wreathed with flowers in early summer. Flowers mostly white but may be more or less heavily spotted with pink, red or purple, and soft pink, rich pink and even yellow flowers occur. Rosettes die after flowering. Nearly all avid lime-lovers and sun worshippers.
12. **Kabschia.** Contains the elite of the genus. All small, cushion-forming densely-tufted plants. Individual rosettes may consist of more or less sharply-spiny leaves or the leaves may be broader and more spreading and bluntly or roundly pointed. Flowers may be produced singly or several on a short, more or less branched, stem. May be pure white, soft or rich yellow, lilac, pink or soft red in colour, never spotted. Thirty-six known species, only half of which are in cultivation, and over 100 garden-raised hybrids.
13. **Engleria.** (Really sub-section *Media* of the *Kabschia* group.) Most of the species in this sub-group display a rosette formation resembling that of the *Euaizoon* section and all those in cultivation have leafy flower-stems ending in spikes or branched racemes of tiny flowers enveloped in usually highly-coloured calyces. Even the stem leaves may be more or less highly coloured.
14. **Porphyron.** Creeping and mat-forming plants generally with purple flowers but a few whites and bicolor forms are known. Leaves opposite and only at the crowded ends of the creeping shoots do they approach the typical rosette formation of the genus. Gritty, porous soil and happiest in cool and slightly moist but not sunless positions. Frequent gritty top-dressing of old clumps is advisable.
15. **Tetrameridium.** Only one species of this group has ever been in cultivation. Differs from all the others in having only four sepals and apparently no petals. Solitary flowers on short stems. Dense, tufted habit and short, branching stems densely set with overlapping, opposite, narrow and tiny leaves.

16. **Diptera.** Tufts of broad-bladed, stalked leaves of leathery texture from which arise in autumn branching stems bearing odd-shaped flowers usually having one or two petals much elongated and often notched along the margin. Cool positions in soil containing much humus. Flowers pure white or occasionally spotted.

SPECIES CULTIVATED: *S. aizoides* (10), yellow, 3 to 4 in., summer, Europe, and vars. *atrorubens*, blood-red, *aurantia*, orange, and *autumnalis*, orange, autumn; *Aizoon* (11), white, 6 in., summer, Europe, and innumerable vars.; *Andrewsii* (3-11), pink, 9 in., summer, hybrid; *apiculata* (12), yellow, 4 in., spring, hybrid; *aquatica* (8), white, 12 in., early summer, Pyrenees; *Arco-Valleyi* (12), rose, 1 in., spring, hybrid; *aretioides* (12), yellow, 2 in., early summer, Pyrenees; *aspera* (9), yellow, speckled orange, 3 in., summer, Europe, and var. *bryoides*, smaller flowers spotted red; *assimilis* (12), white, 2 in., spring, hybrid; *Biasoletii* (13), red, 4 in., spring, hybrid; *biflora* (14), purple, 2 in., spring, Alps, no lime; *Bileckii* (12), yellow, 2 in., spring, hybrid; *Borisii* (12), yellow, 3 in., spring, hybrid; *Boryi* (12), white, 2 to 3 in., spring, Greece; *Boydii* (12), citron-yellow, 3 in., spring, hybrid; *Brunoniana* (2), yellow, 3 in., summer, Himalaya; *Burseriana* (12), white, 3 in., early summer, E. Alps, and many fine vars.; *bursiculata* (12), white, 3 in., spring, hybrid; *caesia* (12), white, 2 in., summer, Pyrenees, E. Alps; *Camposii* (8), white, 9 in., summer, Spain; *canis-dalmatica* (11), white, spotted red, 6 in., summer, hybrid; *cartilaginea* (11), white, 6 in., summer, Caucasus; *cebenensis* (8), white, 3 in., May, Cent. France; *Clibranii* (8), deep red, 6 in., early summer, hybrid; *cochlearis* (11), white, 6 in., summer, Maritime Alps; *conifera* (8), white, 1 to 2 in., summer, Pyrenees; *cortusaeifolia* (16), white, 12 in., Sept., Japan; *corymbosa* (13), yellow, 4 in., early summer, Asia Minor, Bulgaria; *Cotyledon* (11), white, 18 to 24 in., summer, Alps, and numerous vars.; *crustata* (11), white, 3 to 4 in., summer, E. Alps; *cuneifolia* (3), white, 3 in., summer, Alps; *cuscutaeformis* (16), white flushed pink, 3 in., summer, India; *Cymbalaria* (5), yellow, 2 in., summer, Caucasus, Asia Minor, annual; *diapensioides* (12), white, 1 in., spring, Alps; *Elizabethae* (12), soft yellow, 3 in., spring, hybrid; *Engleri* (11), white, 9 in., summer, Carinthia, natural hybrid; *erioblasta* (8), white, 2 in., summer, Spain; *exarata* (8), cream, 3 in., spring, Pyrenees to Balkans; *Ferdinandi-Coburgii* (12), yellow, 4 in., spring, Bulgaria; *Fortunei* (16), white, 12 to 15 in., autumn, Asia; *Geum* (3), white, 4 to 6 in., summer, Europe (Br.); *Gordoniana* (12), yellow, 4 in., spring, hybrid; *granulata* (7), 'Meadow Saxifrage', white, 12 in., summer, Europe (Br.), and var. *flore-plena*, double; *Grisebachii* (13), crimson, 9 in., summer, Greece; *Haagii* (12), yellow, 3 in., spring, hybrid; *Hirculus* (2), yellow, 6 in., summer, Europe (Br.); *Hostii*, cream, 12 in., summer, Europe; *hypnoides* (8), white, summer, 4 in., Europe (Br.), and many garden hybrids; *irrigua* (7), white, 12 to 18 in., summer, Crimea, biennial; *Irvingii* (12), pink, 2 in., spring, hybrid; *juniperifolia* (12), yellow, 3 in., spring, Caucasus; *Kellereri* (12-13), soft pink, 4 in., Feb., hybrid; *Kotschyi* (12), yellow, 3 in., spring, Asia Minor; *latepetiolata* (7), milk-white, 12 to 15 in., Spain, biennial; *lilacina* (12), lilac, $\frac{1}{2}$ in., spring, Himalaya; *lingulata* (11), white, 9 to 12 in., summer, Maritime Alps, and numerous vars.; *longifolia* (11), white, 2 ft., summer, Pyrenees; *Macnabiana* (11), white, spotted red, 12 in., summer, hybrid; *marginata* (12), white, 4 in., early summer, Italy to the Balkans; *media* (13), pink, 6 in., spring, Pyrenees; *moschata* (8), white, pink, or pale yellow, 3 in., summer, Europe (parent of many garden hybrids); *muscooides* (8), white, 3 in., summer, Europe; *mutata* (11), yellow, 9 to 12 in., summer, E. Alps; *Obristii* (12), white, 4 in., spring, hybrid; *oppositifolia* (14), pink, 2 in., spring, Europe (Br.); *Paulinae* (8), yellow, 4 in., spring, hybrid; *pedemontana* (8), white, 4 in., summer, Europe; *pennsylvanica* (1), yellow-white, 2 to 3 ft., summer, N. America; *Petraschii* (12), white, 3 to 4 in., spring, hybrid; *porophylla* (13), pink, 6 in., summer, Italy; *retusa* (14), red, 1 in., summer, Alps; *rotundifolia* (4), white, speckled pink, 12 in., summer, Europe; *Salomonii* (12), white, 3 to 4 in., spring, hybrid; *sancta* (12), yellow, 4 in., summer, Asia Minor; *sarmentosa* (16), 'Mother of Thousands', white, pink spotted, 9 to 12 in., summer, Asia;

scardica (12), white, 4 in., summer, Macedonia; *Sibthorpii* (5), yellow, 2 in., summer, Greece, annual; *Spruneri* (12), white, 2 to 3 in., spring, Greece; *squarrosa* (12), white, 1 to 2 in., summer, Mts. Europe; *Stribnyi* (13), pink, 4 in., summer, Bulgaria; *taygetea* (4), white, spotted pink, 2 to 3 in., summer, Greece; *tenella* (8), white, 2 to 3 in., summer, E. Alps; *tombeanensis* (12), white, 2 in., summer, Europe; *umbrosa* (3), 'London's Pride', pink, 9 in., summer, Europe (Br.), and many vars.; *valdensis* (11), white, 2 to 3 in., summer, Europe; *Vandellii* (12), white, 3 to 4 in., summer, Italy; *Veitchiana* (16), white, 9 in., late summer, China.

Scabiosa (Scabious; Pincushion Flower)—*Dipsaceae*. Hardy annual and perennial herbs. Flowers useful for cutting.

CULTURE OF ANNUAL SPECIES: Soil, good rich ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{8}$ in. deep in light, sandy soil in temp. of 60° to 70° in Feb. or March and plant out in May to ensure plants flowering same year, or outdoors in June or July, transplanting following March to flowering position. In cold districts lift the seedlings in Aug. and place in small pots; winter in cold frame and plant out in April.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary deep rich. Position, sunny well-drained borders heavily dressed with lime for *S. caucasica*; sunny rockeries for *S. graminifolia*; ordinary borders for *S. Columbaria*, etc. Plant, March or April. Top-dress annually in Feb. or March with decayed manure. Lift, divide and replant every three or four years.

PROPAGATION: By division of roots, March, or cuttings of 2 in. growth.

ANNUAL SPECIES CULTIVATED: *S. atropurpurea*, 'Sweet Scabious' or 'Mournful Widow', various colours, single and double, July, 1 to 3 ft., S. Europe.

PERENNIAL SPECIES CULTIVATED: *S. caucasica*, 'Caucasian Scabious', light blue, summer, to 2 ft., Caucasus, and vars. *alba*, white, *goldingensis*, large lavender, *perfecta*, large and fringed; *Columbaria*, blue, 2 ft., Europe, Africa, Asia, and var. *rosea*, pink; *ochroleuca*, yellow, July, 1½ ft., Europe. See also *Cephalaria*, *Knautea* and *Succisella*.

Scarborough Lily, see *Vallota speciosa*.

Schaueria—*Acanthaceae*. Stove flowering and ornamental foliage plant. Formerly included in *Justicia*. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat, leaf-mould and sand. Position, well-drained pots in light stove or warm greenhouse Sept. to June, sunny frame or house June to Sept. Pot, March or April. Water moderately Sept. to March, freely other times. Temp., Sept. to March 55° to 65°, March to June 65° to 75°. Prune into shape after flowering. Stop growth several times during summer to induce bushy habit. Feed with diluted liquid manure or approved fertiliser when plants are established in final pots.

PROPAGATION: By cuttings of young shoots inserted in sandy soil in propagating case with bottom heat, March to July.

SPECIES CULTIVATED: *S. flavicoma* (syn. *S. calycotricha*), yellow, winter, 2 ft., Brazil. See also *Jacobinia*.

Schisandra—*Magnoliaceae*. Hardy deciduous aromatic climbing shrubs with large leaves and scarlet berries. Sometimes spelled *Schizandra*. First introduced mid-nineteenth century.

CULTURE: Soil, loam and peat. Position, sunny walls or arbours. Plant, Sept. and Oct. or April. Prune straggly shoots, April.

PROPAGATION: By cuttings of firm shoots inserted in sandy peat under bell-glass in cold frame, July to Oct.

SPECIES CULTIVATED: *S. chinensis*, pale rose, fragrant, April to May, 20 to 30 ft., E. Asia, Japan; *glaucescens*, orange-red, April to May, 10 to 20 ft., Cent. China; *grandiflora*, glabrous, W. China, var. *rubrifolia*, red, April; *Henryi*, white, April to May, climbing, W. China; *sphenanthera*, yellow, April to May, climbing, W. China.

Schismatoglottis—*Araceae*. Dwarf stove perennial herbs. Leaves, oblong or heart-shaped, green or striped with silver grey, purple or yellow. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts sandy loam, fibrous peat, leaf-mould and silver sand. Position, well-drained pots in shady part of stove. Pot, Feb. or March. Water copiously April to Sept., moderately afterwards. Syringe daily April to Sept. Apply stimulants occasionally during summer. Temp., Sept. to March 60° to 65°, March to Sept. 75° to 85°.

PROPAGATION: By division, Feb. or March.

SPECIES CULTIVATED: *S. asperata*, leaves deep green dotted white above and black beneath, Borneo, and var. *albo-maculata* (syn. *S. crispata*), leaves silvery above; *concinna* (syn. *S. Lavellei*), leaves mottled with grey, Borneo; *neoguineensis*, leaves blotched with yellow, New Guinea; *pulchra*, leaves spotted with silvery white, Borneo. *S. siamensis* is a name frequently applied in catalogues to an unidentified plant, having leaves spotted with white and requiring the same treatment as *Schismatoglottis*.

Schizanthus (Butterfly or Fringe Flower)—*Solanaceae*. Half-hardy annual herbs. Natives of Chile. First introduced early nineteenth century.

OUTDOOR CULTURE: Soil, good ordinary rich. Position, sunny beds or borders. Sow seeds thinly in pots, pans, or boxes filled with light soil and place in temp. 65° to 75° in Feb. or March. Cover slightly with fine soil. Transplant seedlings when 1 in. high (four in a 3 in. pot), harden off in frame, and plant out in May. Sow also similarly in Aug., transplant three in a 3 in. pot, and place on shelf in light, airy greenhouse until following May, then plant out. Sow likewise outdoors end of April where required to grow.

POT CULTURE: Compost, one part loam, half a part each of decayed manure and leaf-mould, little sand. Sow seeds thinly in above compost in cool greenhouse or frame in Aug. Transplant seedlings singly in 3 in. pots and grow on shelf in greenhouse (temp. 45° to 55°) until Jan., then transfer to 6 in. pots and grow in light position. Water moderately in winter, freely other times. Apply weak stimulants occasionally whilst flowering. Support plants with stakes. For summer flowering sow seeds in temp. 55° to 65° in Feb. or March, transplanting when 1 in. high to 3 in. pots, then into 5 in. pots.

SPECIES CULTIVATED: *S. Grahamii*, lilac and orange, summer, 12 to 18 in., and many selected colour forms; *pinnatus*, rose, purple, and yellow, summer, 12 to 18 in., and many selected colour forms; *retusus*, rose, crimson, and orange, summer, 18 in., and several selected colour forms; *wisetonensis*, pink, white, and brown, summer, 1 ft., hybrid. The strains known as *S. hybridus grandiflorus* contain many colour forms.

Schizocentron—*Melastomaceae*. Greenhouse flowering plants of trailing habit. First introduced early nineteenth century.

CULTURE: Compost, equal parts sandy loam, peat and leaf-mould. Position, pots, pans or hanging baskets in shady greenhouse or conservatory. Water freely March to Oct., moderately at other times. Feed with diluted liquid manure when established.

PROPAGATION: By cuttings of young shoots inserted in pots of sandy soil under bell-glass or in propagating frame with gentle heat.

SPECIES CULTIVATED: *S. elegans* (syn. *Heeria elegans*), rose, trailing, spring, Mexico.

Schizocodon, see *Shortia*.

Schizopetalon—*Cruciferae*. Half-hardy annual. First introduced early nineteenth century.

CULTURE: Sow seeds in light, warm, rich soil in open border, April or May. Cover seeds lightly with fine soil. Thin seedlings when 1 to 2 in. high to 3 or 4 in. apart. Support plants when 6 in. high with small bushy twigs. Water freely in dry weather or sow thinly in well-drained pans filled with compost of loam,

peat and sand placed in temp. of 50° to 55° in early April, transplanting seedlings three or four in 3 in. pots filled with above compost; harden off in cold frame and plant out in late May.

SPECIES CULTIVATED: *S. Walkeri*, white, almond scented, summer, 6 to 9 in., Chile.

Schizophragma—*Saxifragaceae* (or *Hydrangeaceae*). Hardy, deciduous, self-clinging, climbing, flowering shrubs of very great vigour, closely related to *Hydrangea*.

CULTURE: Soil, ordinary. Position, requiring space, high walls, tree trunks or pergolas. Easily cultivated. Plant, Oct. or April. Prune straggly shoots into shape, April.

PROPAGATION: By cuttings inserted in sand under a bell-glass in temp. 55° in spring.

SPECIES CULTIVATED: *S. hydrangeoides*, yellowish-white, July, 20 to 30 ft., Japan; *integrifolium*, white, July, to 40 ft., China.

Schizostylis (Kaffir Lily; Crimson Flag)—*Iridaceae*. Hardy bulbous or rhizomatous-rooted perennial. First introduced mid-nineteenth century.

OUTDOOR CULTURE: Soil, moist, loamy. Position, warm, sunny border. Plant, Oct. to March. Protect in severe weather by covering of dry litter. Water freely in dry weather in summer and apply stimulants occasionally.

POT CULTURE: Compost, two parts loam, one part decayed manure, little sand. Pot, Nov. to March. Position, cold frame, Dec. to April; plunged to the rim of pots in sunny border, April to Sept.; cold greenhouse, Sept. to Dec. Water copiously in summer, moderately other times. Apply stimulants occasionally in summer. Repot annually.

PROPAGATION: By division of rhizomes or roots in March or April.

SPECIES CULTIVATED: *S. coccinea*, crimson, Oct. and Nov., 1 to 3 ft., S. Africa, and vars.

Schlumbergera (Leaf-flowering Cactus)—*Cactaceae*. Greenhouse succulent plants. First introduced early in the nineteenth century under the name of *Epiphyllum*.

CULTURE: Compost, equal parts turfy loam, peat and leaf-mould, one-fourth part silver sand. Position, light warm greenhouse, Sept. to June, sunny place outdoors, or in cold frame June to Sept. Water moderately Sept. to April, a little more freely other times. Temp., Nov. to March 50° to 60°, March to June 55° to 65°, Sept. to Nov. 40° to 45°.

PROPAGATION: By cuttings inserted singly in 3 in. pots filled with sandy soil and brick dust in March or April; grafting on to stock of *Pereskia aculeata* or *P. Bleo* in temp. 65° to 75° in spring.

SPECIES CULTIVATED: *S. Gaertneri*, scarlet and violet, Brazil; *Russelliana*, rose, Brazil.

Schomburgkia—*Orchidaceae*. An epiphytic genus, strong growing, pseudobulbs solid, large. Leaves usually two, rather long, scapes long. Flowers with long whitish or red-tinted pedicels; often with long narrow bracts.

CULTURE: Compost, etc., as for *Cattleyas*. A rather decided rest should be given. The pots must be well drained, the leading growths may be allowed to extend beyond the pot rim for a season.

PROPAGATION: As for *Cattleyas*.

SPECIES CULTIVATED: *S. crispa*, many, brownish-yellow, lip whitish, or rosy, margins yellowish, variable, autumn, winter, British Guiana; *Lueddemanniana*, 12 to 20, rather thickly set, brown, lip rose-red, keels yellow, summer, Venezuela; *Lyonsii* (syn. *S. carinata*), many, white, purple spotted, lip rather small, tipped yellow, bracts long, summer, Jamaica; *marginata*, dull brick red, margined yellow, lip whitish, tinged pink, summer, autumn, Surinam; *splendida*, dark brownish-purple, lip rose-purple, autumn, winter, Colombia; *superbiens* (syn. *Laelia superbiens*), large, fragrant, rose or deep rose, mid-lobe of lip crimson, disk

yellow, scape sometimes 9 ft. long, winter, Guatemala; *undulata* (syn. *S. violacea*), deep purplish-red, shaded brown, lip purplish, summer, Bogota.

Schubertia—*Asclepiadaceae*. Stove and greenhouse flowering evergreen climbers. First introduced early nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand. Position, pots or beds in greenhouse or conservatory. Shoots trained up roof or over trellis. Pot, Feb. or March. Water freely March to Sept., moderately afterwards. Syringe twice daily during spring and summer. Prune shoots during Jan. or Feb. Apply liquid manure occasionally during growing season. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

PROPAGATION: By cuttings of firm side shoots in summer.

SPECIES CULTIVATED: *S. grandiflora* (syn. *Aranjia grandiflora*), white, fragrant, Oct., Brazil; *graveolens*, white, Sept., Brazil.

Sciadopitys (Umbrella Pine)—*Pinaceae* (or *Taxodiaceae*). Hardy evergreen conifer. False leaves, long, tapering, borne in tufts at the end of shoots, parasol-like; green, with yellow groove on their lower surface. First introduced mid-nineteenth century.

CULTURE: Soil, rich, moist, lime-free loam. Position, sheltered from piercing winds. Plant, Sept., Oct., March or April.

PROPAGATION: By imported seeds sown $\frac{1}{2}$ in. deep in pots filled with moist, sandy loam and placed in cold frame or greenhouse, transplanting seedlings outdoors following spring; or $\frac{1}{4}$ in. deep outdoors in April in moist bed of sandy loam, transplanting seedlings next year.

SPECIES CULTIVATED: *S. verticillata*, 'Parasol Fir Tree', slow growing, pyramidal shape, 80 to 120 ft., Japan.

Scilla (Squill)—*Liliaceae*. Greenhouse and hardy bulbous plants.

OUTDOOR CULTURE: Soil, deep, sandy loam. Position, sunny beds, borders, in grass on lawns, or rockeries. Plant, Aug. to Nov., in lines or masses. Depth for planting: Small bulbs 2 in. deep and 2 in. apart; large bulbs 4 in. deep and 3 to 4 in. apart. *S. peruviana* 4 to 6 in. deep in sheltered spot. Mulch with decayed manure, Nov. Lift, divide and replant every third year.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or well-decayed cow manure, one part river sand. Pot, Aug. to Nov., placing small bulbs, 1 in. apart, in a 5 in. pot; or three to five large-sized bulbs, 1 in. deep, in similar pots. Position, under layer of cinder ashes from time of potting till growth commences, then in cold frame, cool greenhouse, or window till past flowering, afterwards in sunny spot outdoors. Water moderately from time growth commences till foliage fades, then keep dry. Repot annually. Apply weak stimulants once or twice during flowering period.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light, sandy soil in boxes or cold frame or outdoors in Sept.; offsets from old bulbs removed when lifting and planted as advised for full-sized bulbs. Seedlings flower when three to four years old.

SPECIES CULTIVATED: *S. amoena*, 'Star Hyacinth', indigo blue, March to May, 6 to 9 in., Europe; *autumnalis*, rosy lilac, Aug. to Sept., 6 in., Europe (Br.); *bifolia*, blue, March, 6 in., Europe, and vars. *alba*, white, *rosea*, rose; *chinensis*, rose, Aug. to Sept., 6 in., China; *hispanica* (syns. *S. campanulata* and *S. patula*), 'Spanish Squill', blue, May, 1 to 1½ ft., Europe, and vars. *alba*, and *rubra*; *non-scripta* (syns. *S. festalis* and *S. nutans*), 'Bluebell', blue, April, 8 to 15 in., W. Europe (Br.); *peruviana*, lilac, May, 6 to 12 in., Algeria, and var. *alba*, white; *pratensis*, lavender, April to May, 6 in., E. Europe; *siberica*, 'Siberian Squill', blue, Feb., 3 to 6 in., Asia Minor, and var. *alba*; *Tubergeniana*, light blue, spring, 6 in., Persia; *verna*, lilac blue, May, 3 in., W. Europe.

Scindapsus—*Araceae*. Stove evergreen climbers.

CULTURE: Compost, equal parts rough peat, sphagnum moss, and coarse sand with a little broken charcoal. Position, pots, with shoots trained to trunks of

tree ferns or walls. Pot, Feb. or March. Water copiously March to Oct., moderately at other times. Syringe freely at all seasons. Temp., Sept. to March 60° to 65°, March to Sept. 80° to 85°. Shade from sun.

PROPAGATION: By division of roots at potting time.

SPECIES CULTIVATED: *S. aureus* (syn. *Pothos aureus*), leaves blotched with pale yellow, 20 ft., Solomon Islands; *pictus*, leaves glaucous, spotted dark green, 20 ft., E. Indies, and var. *argyraeus*, silver-spotted leaves.

Scirpus (Club Rush; Bulrush)—*Cyperaceae*. Greenhouse and hardy perennial marsh or water plants. *S. cernuus* really hardy but almost invariably cultivated as a greenhouse pot plant.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, margins of lakes, streams and ponds. Plant, Oct. to April.

PROPAGATION: By division, Oct. to April.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts loam, leaf-mould, and little sand. Position, small pots arranged along front of staging or in hanging baskets. Pot, Feb. or March. Water abundantly March to Oct., moderately other times. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

PROPAGATION: By division of plants in March.

HARDY SPECIES CULTIVATED: *S. lacustris*, fat green rushes, 3 to 8 ft., chocolate inflorescence, Britain; *maritimus*, 'Sea Club Rush', 3 to 5 ft., inflorescence golden brown, cosmopolitan; *Tabernaemontani*, glaucous stems, Europe, and var. *zebrinus* (syn. *Juncus zebrinus*), 'Porcupine Quill Rush', 'Zebra Rush', stems banded in green and white, 4 to 5 ft.; *triqueter*, triangular stems, 2 to 3 ft., Britain.

GREENHOUSE SPECIES CULTIVATED: *S. cernuus* (syn. *Isolepis gracilis*), 'Club Rush', 6 to 12 in., stems slender and drooping, cosmopolitan.

Scleranthus—*Illecebraceae*. Hardy cushion-forming plants for the rock garden.

CULTURE: Gritty loam or scree soil. Position, full sun.

PROPAGATION: By division of old plants in spring or autumn.

SPECIES CULTIVATED: *S. biflorus*, flowers inconspicuous, green-gold hummocks, 1 in., Tasmania.

Scolopendrium, see *Phyllitis*.

Scolymus (Spanish Oyster Plant; Golden Thistle)—*Compositae*. Hardy biennial and perennial herbs. First introduced mid-seventeenth century.

CULTURE: Soil, ordinary. Position, sunny borders. Plant perennial species Oct. to April. Sow seeds of biennial species $\frac{1}{8}$ in. deep where required to grow, in March or April. Thin seedlings to 8 or 12 in. apart when 2 in. high.

PROPAGATION: Perennial species by seeds sown as above; division of roots in April.

BIENNIAL SPECIES CULTIVATED: *S. hispanicus*, 'Spanish Oyster' or 'Golden Thistle', yellow, Aug., 2 to 3 ft., roots edible, Europe.

PERENNIAL SPECIES CULTIVATED: *S. grandiflorus*, yellow, May, 3 ft., N. Africa.

Scorpion Senna, see *Coronilla Emerus*.

Scorzonera—*Compositae*. Hardy herbaceous perennial with edible roots. Roots, carrot-shaped, white with dark skin, sweet-flavoured. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary, rich, deeply trenched, free from stones. Position, sunny, open. Sow seeds in groups of three or four, 12 in. apart, in drills $\frac{1}{2}$ in. deep and 18 in. apart in April. Thin seedlings when 3 in. high to one in each group. Remove flower heads as soon as seen. Lift the roots in Oct., twist off their leaves, and store in layers with sand or soil between in cellar or outhouse until required for cooking. Artificial manures: 2½ lb. kainit, 1 lb. sulphate of ammonia, 2½ lb. of guano, mixed, per square rod (30¼ square yards) applied before sowing in spring. Requires to be raised from seed annually for producing roots for culinary purposes. Seeds germinate in seven to twelve days and retain their vegetative powers for two to three years. Crop reaches maturity in eighteen weeks.

SPECIES CULTIVATED: *S. hispanica*, 'Black Salsify', yellow, June to Sept., 2 to 3 ft., S. Europe.

Scotch Heather, see *Calluna vulgaris*; **-Pine**, see *Pinus silvestris*; **-Thistle**, see *Onopordum Acanthium*.

Screw Pine, see *Pandanus*.

Scurvy Pea, see *Psoralea*.

Scutellaria (Helmet Flower; Skull Cap)—*Labiatae*. Stove and herbaceous perennials.

CULTURE OF STOVE SPECIES: Compost, two parts loam, one part of equal proportions of leaf-mould, decayed manure and sand. Position, light part of stove Sept. to June; sunny cold frame remainder of year. Pot, Feb. or March. Prune shoots directly after flowering (Feb.) to within 3 in. of base. Good drainage essential. Nip off points of main shoots when 3 in. long, also of lateral shoots when of similar length, to induce bushy growth. Water freely Sept. to April, moderately afterwards. Syringe daily April to Sept. Apply stimulants once a week May to Dec. Temp., Sept. to March 55° to 65°, March to June 70° to 80°.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, open, sunny borders or rockeries. Plant, March or April. Lift, divide and replant only when overgrown.

PROPAGATION: Stove species by cuttings of firm shoots, 2 to 3 in. long, inserted in light, sandy soil under bell-glass in temp. 75° to 85° in spring; hardy species by seeds sown outdoors in April; division of roots in March or April.

STOVE SPECIES CULTIVATED: *S. coccinea*, scarlet, summer, 1 to 3 ft., Colombia; *javanensis*, violet-blue, summer, 1½ ft., China; *Mociniana*, scarlet and yellow summer, 2 to 3 ft., Mexico; *violacea*, violet-blue, summer, 2 ft., India and Ceylon.

HARDY SPECIES CULTIVATED: *S. alpina*, purple, Aug., 6 to 8 in., S.E. Europe; *baicalensis*, blue, July to Sept., 6 to 12 in., E. Asia, and var. *coelestina*, bright blue; *indica japonica*, lavender, summer, 1 ft., Japan; *orientalis*, yellow, July to Aug. 6 to 12 in., Greece, Asia Minor.

Scuticaria—*Orchidaceae*. An epiphytic genus. Only two species are met with in cultivation. Two other named kinds are doubtful species, probably vars. Pseudo-bulbs short, small, each developed in a more or less terete leaf, scapes short from base of pseudo-bulbs. Flowers 1 to 3, comparatively large.

CULTURE: Compost, osmunda fibre or substitute and sphagnum moss in equal quantities. Water liberally in summer and maintain a moist atmosphere. Temp., 70° or more with shading. In winter less humidity, fewer waterings, night temp. 60°; *S. Hadwenii* can be accommodated in a pan suspended near the glass. *S. Steelii* should have a raft covered with compost, suspended if possible against a wall. The syringe may be freely used on both species in summer.

PROPAGATION: The rhizome often branches and pieces with leaves and roots may be taken from it and potted as growth commences.

SPECIES CULTIVATED: *S. Hadwenii* (syn. *Bifrenaria Hadwenii*), yellow, tinted green, blotched chocolate, lip with lighter spots and rosy spots on margin. Leaves erect, or nearly so, 9 to 18 in., variable, summer, Brazil; *Steelii*, larger, yellowish, spotted red-brown, lip with brown-crimson streaks, leaves 2 to 4 ft. long, summer, various, British Guiana.

Sea Buckthorn, see *Hippophae*; **-Holly**, see *Eryngium maritimum*; **-Lavender**, see *Limonium*; **-Onion**, see *Urginea maritima*; **-Pink**, see *Armeria maritima*; **-Poppy**, see *Glaucium*.

Seakale, see *Crambe maritima*; **-Beet**, see *Beta vulgaris* var. *Cicla*.

Sedge, see *Carex*.

Sedum (Stonecrop)—*Crassulaceae*. Succulent greenhouse and hardy evergreen and herbaceous perennials, biennials and annuals. *S. album* can become a troublesome weed.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts sandy loam, one part

brick rubbish, one part of equal proportions of dried cow dung and sand. Position, pots or pans in sunny greenhouse. Pot, Feb. to April. Water freely April to Oct., very little afterwards. Temp., Oct. to March 40° to 50°, March to Oct. 45° to 55°.

CULTURE OF HARDY PERENNIAL SPECIES: Soil, ordinary or sandy loam. Position, sunny, dry rockeries and borders. Plant, Nov. to April.

CULTURE OF ANNUAL SPECIES: Soil, ordinary. Position, sunny, dryish banks, rockeries or borders. Sow seeds thinly in April where required to grow and lightly cover with fine soil. Thin 3 to 6 in. apart when 2 in. high.

PROPAGATION: Greenhouse species by seeds sown in well-drained pots or pans filled with fine compost of equal parts brick rubble, sandy loam and sand and placed in temp. of 55°, Feb. to May; also by cuttings of shoots inserted in brick rubble, loam and sand in temp. 45° to 55° in summer; division of roots at potting time. Hardy species by seeds sown outdoors in April or division of the roots in March or April, or cuttings.

SPECIES CULTIVATED: *S. acre*, yellow, 2 in., May to June, Europe (Br.), and vars. *majus* and *aureum*; *Aizoon*, yellow, 12 in., summer, Asia; *alamosanum*, tender, pink, 2 in., summer, Mexico; *alboroseum*, white and rose, 18 in., late summer, Japan and China; *album*, white, 4 in., summer, Europe, Africa and Asia, and vars. *micranthum*, a miniature desirable form, *chloraticum*, greenish-white, 1 to 2 in., *murale*, deep purple leaves; *amecamecanum*, buff and orange, 6 in., summer, tender, Mexico; *Anacampteros*, greenish-purple, handsome stems and leaves, trailing, Alps; *anglicum*, white, tinged pink, 2 in., summer, Europe (Br.); *anopetalum*, rich cream, 6 in., summer, Europe; *bellum*, white and purple, 3 in., summer, Mexico, tender; *brevifolium*, blue-grey leaves, white flowers, $\frac{1}{2}$ in., summer, Europe and N. Africa, and var. *quinquefarium*, twice as large; *cauticolum*, rose-crimson, 4 to 6 in., autumn, Japan; *Cepaea*, annual, white, 4 in., summer, Europe; *Chanetii*, white, 6 in., autumn, China; *caeruleum*, annual, blue, 2 to 3 in., late summer, S. Europe; *crassipes* (syn. *S. asiaticum*), white and purple, 9 in., summer, Himalaya; *cupresoides*, golden, 3 in., late summer, tender, Mexico; *dasyphyllum*, blush pink, 2 in., summer, S. Europe, and vars. *glanduliferum*, very hairy form, *macrophyllum*, twice as large as the type; *divergens*, golden, 2 to 3 in., summer, N. America; *Douglasii*, yellow, 12 in., July, N. America; *Ellacombianum*, yellow, 6 in., late summer, Japan; *Ewersii*, pink, 9 in., late summer, Himalaya, and var. *homophyllum*, condensed form; *floriferum*, yellow, 4 to 6 in., July to Aug., China; *gracile*, white, 2 in., summer, Caucasus; *gypsicolum*, white, 3 in., summer, Spain; *hirsutum*, white or pink, 3 in., summer, Europe; *hispanicum*, white, 2 in., summer, Europe and Persia; *Hobsonii* (syn. *S. Praegerianum*), deciduous, pink, summer, 1 in., Tibet; *humifusum*, yellow, 2 in., spring, tender, Mexico; *hybridum*, yellow, 4 in., spring and autumn, Siberia and Mongolia; *kamtschaticum*, orange-yellow, 6 in., late summer, Asia, and var. *variegatum*, variegated foliage; *lydium*, white, 2 in., June, Asia Minor; *magellense*, white, 4 in., spring, Italy; *maximum*, white, 2 ft., summer, annual, Europe, and var. *atropurpureum*, mahogany leaves and reddish flowers; *Middendorffianum*, yellow, late summer, 4 to 6 in., Siberia; *moranense*, white, 4 in., July, Mexico, and var. *arboreum*, like a miniature tree, 6 in.; *multiceps*, yellow, 4 in., summer, Algeria; *Nevii*, white, 3 in., summer, Eastern U.S.A.; *oaxacanum*, yellow, 2 in., summer, tender, Mexico; *oreganum*, golden, 3 in., late summer, N. America; *Palmeri*, yellow, 9 in., May to July, slightly tender, Mexico; *pilosum*, rose-red, 3 in., May to June, biennial, Asia Minor; *populifolium*, white, 9 in., late summer, Siberia; *primuloides*, white, 2 to 3 in., summer, China; *pulchellum*, pink, prostrate, summer, U.S.A.; *reflexum*, yellow, 6 to 9 in., summer, Europe, and var. *cristatum*, fasciated growths; *retusum*, white and pink, 6 in., summer, Mexico; *Rosea* (syns. *Rhodiola rosea*, *S. roseum*, *S. Rhodiola*), 'Rose-root', greenish-yellow, 12 to 15 in., summer, Europe, Asia, America; *rupestre*, yellow, 6 in., July, Europe (Br.); *sediforme* (syn. *S. altissimum*), pale yellow, summer, 12 to 18 in., Europe, etc.; *sempervivoides*, crimson, 4 to 6 in., June, biennial, Caucasus, Asia Minor; *sexangulare*, yellow, 2 in., summer, Europe; *Sieboldii*, rose-red, 9 in., June, Japan, and var. *variegatum*, variegated leaves;

spathulifolium, yellow, 3 to 4 in., May to June, N. America, and var. *purpureum*, leaves stained deep purple; *spectabile*, pink, 12 to 15 in., autumn, Japan, and var. *atropurpureum*, rich red flowers; *spurium*, pink, 2 in., summer, Caucasus, and var. *album*, white; *Stahlii*, yellow, 4 in., autumn, tender, Mexico; *stoloniferum*, rose, 6 in., June, Asia Minor; *Tatarinowii*, pink, 2 to 3 in., July to Aug., China; *Telephium*, pink, 12 in., summer, Europe (Br.); *tenuifolium* (syn. *S. amplexicaule*), yellow, summer, 4 to 6 in., S. Europe; *ternatum*, white, 4 in., spring, N. America; *trifidum*, purple-red, 9 in., late summer, China, and var. *album*, white; *Winkleri*, white, 3 in., summer, Spain.

Selaginella—*Selaginellaceae*. Stove and greenhouse evergreen moss-like plants, allied to ferns. Fronds creeping or erect, branched, green or variegated. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts fibrous peat and chopped sphagnum moss. Position, pots, pans or rockeries in shade. Pot or plant, Feb. or March. Water copiously April to Sept., moderately afterwards. Syringe daily April to Sept. Shade from sun. Temp., stove species, Sept. to March 55° to 65°, March to Sept. 70° to 80°; greenhouse, Sept. to March 40° to 50°, March to Sept., 55° to 65°.

PROPAGATION: By cuttings of foliage stems inserted in above compost in well-drained pots and plunged in fibre refuse in a temp. of 80° at any season, or the smaller growers may be spread upon the surface of pans of compost and covered with glass until rooted.

STOVE SPECIES CULTIVATED: *S. cuspidata*, W. Indies; *Emmeliana*, erect branching, to 1 ft., Trop. America, and var. *variegata*; *erythropus*, 10 to 12 in., W. Indies; *flabellata*, 4 to 8 in., Tropics and Subtropics; *haematodes*, 1 to 2 ft., W. Indies; *lepidophylla*, 'Resurrection Plant', frequently sold as a curiosity, Texas; *Vogelii*, 1 to 2 ft., Africa; *Wallichii*, tall, erect, dense, Penang; *Wildenowii*, climbing, Trop. Asia.

GREENHOUSE SPECIES CULTIVATED: *S. apoda*, annual, Mexico to Texas; *Braunii*, 12 to 18 in., China; *caulescens* (syn. *S. amoena*), 1 to 2 ft., Malay, etc.; *Douglasii*, creeping, pale green, British Columbia to California; *Kraussiana*, creeping or trailing, S. Africa; *Martensii*, 6 to 12 in., Mexico; *rupestris*, dwarf, tufted, with white tips, E. America; *uncinata* (syn. *S. caesia*), trailing, China.

Selenicereus—*Cactaceae*. Greenhouse succulent plants with angled stems bearing bristles. Formerly included in *Cereus*. First introduced early eighteenth century.

CULTURE: Compost, two parts turfy loam, one part coarse sand and broken brick. Position, well-drained pots or pans in sunny greenhouse or window. Pot as required, Water sparingly. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 60°.

PROPAGATION: By seeds sown in well-drained pots or pans; cuttings of stems in sand.

SPECIES CULTIVATED: *S. grandiflorus*, white, July, Jamaica, Cuba; *Macdonaldiae*, white and red, July, Honduras, Uruguay, Argentine; *pteranthus* (syn. *S. nycticallus*), white, autumn, Mexico. The species mentioned are all night flowering.

Selenipedium, see *Phragmipedium*. Most of the plants cultivated in greenhouses under this name are referred to *Phragmipedium*, probably no true *Selenipediums* are generally known to horticulture.

Selfheal, see *Prunella*.

Semiarundinaria—*Gramineae*. Erect bamboo-like shrubs, formerly included in *Arundinaria*.

CULTURE: Soil, good, not too heavy and of reasonable depth. Position, must be sheltered from cold winds and dry root conditions are disliked.

PROPAGATION: By division in April and May.

SPECIES CULTIVATED: *S. fastuosa* (syns. *Bambusa*, *Arundinaria* and *Phyllostachys fastuosa*), 20 ft., Japan.

Sempervivella—*Crassulaceae*. Hardy succulent-leaved perennials.

CULTURE: As for *Sempervivum* but rather less hot and dry.

PROPAGATION: By seeds; division; cuttings.

SPECIES CULTIVATED: *S. alba*, white, 2 in., spring and summer, Kashmir.

Sempervivum (Houseleek)—*Crassulaceae*. Hardy succulent-leaved perennials. Tender species native to Canary Islands and Madeira have been transferred to *Aeonium*, *Aichryson* and *Greenovia*.

CULTURE: Soil, ordinary, light sandy, containing a little old mortar. Position, open and sunny, chinks, crevices or ledges of rockeries or as edgings to borders. Plant, March to June, close together for edgings in single or double rows. Top-dress annually in March. *S. tectorum*, suitable for growing on sunny roofs or crevices of old walls, plant in mixture of cow dung and clay in March or April.

PROPAGATION: By seeds in spring in compost of equal parts sandy loam, leaf-mould and old mortar in well-drained, shallow pans, lightly covered with fine soil in temp. 55° to 65°; cuttings of shoots or leaves dried for a day or so after removal from plant and inserted in above compost in summer; division of offsets in March.

There are too many species with, in many instances, differences too slight for brief descriptions to justify a detailed list here. The figures given in following list refer to approx. diameter of rosettes.

SPECIES CULTIVATED: *S. Allionii*, 1 in., greenish-white, Alps; *arachnoideum*, 'Cobweb Houseleek', red, $\frac{3}{4}$ in., Mts. S. Europe; *arenarium*, pale yellow, rosettes globular, Tyrol; *atlanticum*, pale red in panicles, 3 in., Morocco; *ciliolum*, greenish-yellow, 2 in., Bulgaria; *dolomiticum*, rose-red, $2\frac{1}{2}$ in., tufted, Alps; *erythraeum*, red-purple with white lines, 2 in. tufted, Bulgaria; *globiferum*, pale yellow, 3 in., Russia; *grandiflorum*, yellow, $1\frac{1}{2}$ in., Alps; *Heuffelii*, pale straw, 2 in., Greece; *hirtum*, pale yellow, $1\frac{1}{4}$ in., S. Europe; *leucanthum*, pale or greenish yellow, 3 in., leaves hairy and purple tipped, Bulgaria; *Kindingeri*, waxy-white, reddish at base, $2\frac{1}{2}$ in., Macedonia; *montanum*, purplish in hairy panicle, $1\frac{1}{4}$ in., Alps, Pyrenees; *Pittonii*, yellowish-white in hairy head, $1\frac{1}{2}$ in., Syria; *pumilum*, purple, 1 in., Caucasus; *ruthenicum*, pale yellow, filaments purple, $1\frac{1}{2}$ in., E. Europe; *soboliferum*, pale yellow in dense panicles, $1\frac{1}{2}$ in., Austria; *tectorum*, 'Common Houseleek', pinkish on hairy branches, 3 to 4 in., Europe, Asia, and numerous vars.; *Wulfenii*, pale yellow in dense hairy panicle 2 to 3 in. across, 2 in., Cent. Europe.

Senecio (Groundsel; Ragwort)—*Compositae*. Greenhouse and hardy annuals, evergreen herbs or climbers, herbaceous perennials and evergreen shrubs. *S. Smithii* is grown in the water garden. Florists' Cinerarias are hybrids or vars. of *S. cruentus*. First introduced early eighteenth century. See also *Ligularia*.

CULTURE OF ANNUAL SPECIES: Soil, ordinary rich. Position, sunny beds or borders. Sow seeds in April $\frac{1}{8}$ in. deep in patches or lines where required to grow. Thin seedlings 3 to 6 in. apart when 1 in. high.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or well-decayed manure and one part sand. Place in 6 in. pots, well drained, press firmly, and sow seeds thinly in April, covering with fine mould. Stand pots in cold greenhouse, window or frame. Thin seedlings when 1 in. high to 2 in. apart. Water moderately and apply stimulants when flowers show.

CULTURE OF CLIMBING SPECIES: Compost, two parts sandy loam, one part well-decayed manure or leaf-mould and one part sand. Position, well-drained pots in sunny greenhouse or window; dwarf kinds on staging or inside window sills; tall kinds trained up roof of greenhouse or round window frames. Pot, March or April. Water freely April to Oct., very little afterwards. Apply stimulants occasionally in summer. Temp., March to Oct. 55° to 65°, Oct. to March 40° to 50°.

CULTURE OF HYBRID CINERARIAS (*S. cruentus*): Compost, two parts yellow loam, one part leaf-mould and coarse silver sand. Sow seeds during May and June $\frac{1}{16}$ in. deep in well-drained pans or pots of above finely-sifted compost. Cover

top of pot with square of glass, keep soil moist and shade from sun. Transplant seedlings when three leaves are formed singly in small pots; keep in cold frame and shaded. Shift into $4\frac{1}{2}$ in. pots in July, 6 in. size in Aug. Remove to greenhouse in Oct., near glass. Apply weak liquid manure twice weekly from Sept. onwards. Liquid cow manure best for cinerarias. Fumigate frequently to destroy aphids. Temp., Oct. to time plants have ceased flowering, 45° to 50° . Sow in May for winter flowering, June for spring flowering. Double-flowered or choice single kinds may be increased by cuttings.

CULTURE OF *S. CINERARIA*: Compost, same as above. Pot, March. *S. Smithii* in water garden. Plant outdoors in June. Lift in Sept. Water moderately if grown in pots. Sometimes used for carpet bedding.

CULTURE OF HARDY SPECIES: Soil, deep, rich loam. Position, partially shady, moist border. *S. uniflorus* on sunny banks in the rock garden. Plant, March or April. Mulch with decayed manure annually in March. Water freely in dry weather.

CULTURE OF SHRUBBY SPECIES: Soil, ordinary. Position, warm, sunny borders sheltered from cold winds. Plant, Sept. to Oct. or April to May.

PROPAGATION: Greenhouse species by seeds sown in March or April, $\frac{1}{8}$ in. deep, in a compost of equal parts loam, leaf-mould and sand in well-drained pots or pans in temp. 65° to 75° ; by cuttings inserted in similar soil and temp. in spring or early summer. Hardy species by seeds sown $\frac{1}{8}$ in. deep outdoors in April; division of the roots in March or April. Shrubby species by cuttings of nearly ripe wood in sandy soil under bell-glass in July or Aug.

ANNUAL SPECIES CULTIVATED: *S. elegans* (syn. *Jacobaea elegans*), various colours, single and double, summer, 1 to 2 ft., S. Africa.

GREENHOUSE SPECIES CULTIVATED: *S. Cineraria* (syn. *Cineraria maritima*), 'Dusty Miller', yellow, summer, leaves silvery, 1 to 2 ft., Medit. Region; *cruentus* (syn. *Cineraria cruenta*), parent of the well-known cinerarias, purple, summer, 1 to 2 ft., perennial but grown as an annual, Canaries; *grandiflora*, yellow, spring, to 5 ft., Mexico; *Heritieri*, white and purple, spring, scandent, Teneriffe; *leucostachys*, yellow, silver foliage, summer, 2 to 3 ft., Patagonia; *mikanioides*, 'German Ivy', yellow, winter, climber, S. Africa; *multibracteatus*, purple, summer, 4 to 5 ft., S. Africa; *Petasites*, 'Velvet Groundsel', yellow, spring, to 5 ft., Mexico.

HARDY SPECIES CULTIVATED: *S. adonidifolius*, orange, July to Aug., 8 to 12 in., Europe; *aurantiacus*, orange-yellow, summer, 1 to $1\frac{1}{2}$ ft., Europe; *Doronicum*, yellow, summer, 1 ft., Europe; *incanus*, silver-grey cushions of foliage, Europe; *macrophyllus* (syn. *Jacobaea macrophylla*), golden yellow, summer, 4 to 5 ft., Caucasus; *pulcher*, red-purple, late summer, 2 to 4 ft., Uruguay and Argentine; *Smithii*, white, June, 3 ft., Cape Horn; *tanguticus*, golden yellow, July to Sept., 6 to 7 ft., W. China; *uniflorus*, yellow, July, 3 in., S. Europe.

SHRUBBY SPECIES CULTIVATED: *S. Greyi*, yellow, summer, 3 ft., New Zealand; *laxifolius*, yellow, June to Aug., 2 to 4 ft., New Zealand; *Monroi*, yellow, June to Aug., 2 ft., New Zealand.

Senna, see Cassia.

Sensitive Fern, see *Onoclea sensibilis*; -**Plant**, see *Mimosa pudica*.

Sequoia (Californian Redwood)—*Pinaceae* (or *Taxodiaceae*). Hardy evergreen coniferous trees. First introduced mid-nineteenth century.

CULTURE: Soil, deep loam. Position, sunny sheltered. Plant, Sept. to Oct. or April to May.

PROPAGATION: By seeds in sandy soil in cold frame in spring, transplanting seedlings when large enough to handle, 6 in. apart in rows 6 in. asunder; variegated kinds by grafting on common species.

SPECIES CULTIVATED: *S. sempervirens*, 200 to 300 ft., California.

Sequoiadendron (Wellingtonia)—*Pinaceae* (or *Taxodiaceae*). Tall evergreen coniferous tree with deeply furrowed spongy bark. First introduced mid-nineteenth century.

CULTURE: Soil, deep loam. Position, sunny sheltered.

PROPAGATION: By seed; cuttings; grafting.

SPECIES CULTIVATED: *S. giganteum* (syn. *Wellingtonia gigantea*, *Sequoia Wellingtonia*), 'Giant Sequoia', to 100 ft. or more, trunk many feet in diameter and bark to 20 in. thick, narrowly pyramidal when young, California.

Serjania—*Sapindaceae*. Tropical woody twining vines. Sometimes spelled Seriania.

CULTURE: Tropical conditions.

PROPAGATION: By seed.

SPECIES CULTIVATED: *S. reticulata*, white, reddish branches, S. America.

Serpent Gourd, see *Trichosanthes Anguina*.

Service Berry, see *Amelanchier canadensis*; **-Tree**, see *Sorbus Aria*.

Shadbush, see *Amelanchier canadensis*.

Shaddock, see *Citrus maxima*.

Shallon, see *Gaultheria Shallon*.

Shallot, see *Allium Cepa* var. *ascalonicum*.

Shamrock Pea, see *Parochetus communis*.

Shasta Daisy, see *Chrysanthemum maximum*.

Sheep Laurel, see *Kalmia angustifolia*.

Sheep's-bit Scabious, see *Jasione*.

Shepherdia—*Elaeagnaceae*. Hardy deciduous ornamental shrubs, producing male and female flowers on different plants. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, open or shady shrubberies in inland or seaside gardens. Plant, Oct. to Feb.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep outdoors in Nov. or Dec.; by cuttings of roots inserted in Feb. or March in ordinary soil outdoors; layering shoots in autumn.

SPECIES CULTIVATED: *S. argentea*, 'Rabbit Berry', 'Buffalo Berry', greenish, spring, scarlet fruits, 8 to 10 ft., N. America; *canadensis*, greenish, spring, yellowish-red fruits, 3 to 6 ft., N. America.

Shibataea—*Gramineae*. Bamboo-like shrubs with flattened zigzag nearly solid stems. Sometimes included in *Phyllostachys* and *Bambusa*.

CULTURE: Soil, rich, deep, sandy loam. Position, moist sheltered borders in south and west only. Protect in winter with dry fern fronds. Plant, March or April.

PROPAGATION: By division of plants in March or April.

SPECIES CULTIVATED: *S. kumasaca* (syns. *Phyllostachys kumasaca*, *ruscifolia* and *viminalis*, *Bambusa kumasaca* and *viminalis*), leaves dark green, 1 to 2 ft., Japan.

Shield Fern, see *Dryopteris*; **-wort**, see *Peltaria*.

Shooting Stars, see *Dodecatheon Meadia*.

Shortia—*Diapensiaceae*. Hardy evergreen stemless herbs. Some species were formerly known as *Schizocodon*. First introduced late nineteenth century.

CULTURE: Soil, equal parts sandy peat and leaf-mould. Position, partially shady border, rhododendron bed or cold frame. Plant, April. Water freely in dry weather.

PROPAGATION: By division of roots in April.

SPECIES CULTIVATED: *S. galacifolia*, white, spring, 3 to 6 in., N. Carolina, and var. *rosea*; *soldanelloides*, deep rose, spring, 4 in., Japan, and vars. *alpina*, *alba*, and *ilicifolia*; *uniflora*, 'Nippon Bells', pink, spring, 6 in., Japan.

Shrimp Plant, see *Beloperone guttata*.

Shrubby Althaea, see *Hibiscus syriacus*; -**Starwort**, see *Microglossa*.

Siberian Squill, see *Scilla siberica*; -**Wallflower**, see *Erysimum Allionii*.

Sibthorpia—*Scrophulariaceae*. Greenhouse and hardy creeping perennial herb.

CULTURE: Compost, equal parts loam, leaf-mould, and little sand. Position, moist, partially shady borders or rockeries outdoors, or in pots or pans in cold frame, or cool, shady indoor fernery or greenhouse under bell-glass. Pot or plant, March or April. Water copiously in dry weather outdoors; also indoors April to Sept.; moderately other times. Moist atmosphere essential for indoor culture.

PROPAGATION: By cuttings inserted in pots of light soil placed under bell-glass in cold greenhouse or frame in summer; division of plants in April.

SPECIES CULTIVATED: *S. europaea*, 'Cornish Moneywort', trailing, small pinkish flowers, W. Europe, and var. *variegata*, golden-green foliage.

Sidalcea—*Malvaceae*. Hardy perennial herbs. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny borders. Plant, Oct. or March. Lift, divide and replant every three or four years.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light soil in April, transplanting seedlings when 1 in. high; division of roots, Oct. or March.

SPECIES CULTIVATED: *S. candida*, white, summer, 3 ft., Rocky Mts.; *malvaeflora*, lilac, summer, 3 ft., California, and vars. *atropurpurea*, purple, *Listeri*, pink; *spicata*, rosy purple, July to Sept., 3 ft., California. There are numerous vars. and hybrids.

Sideritis—*Labiatae*. Perennial dwarf sub-shrubby plants.

CULTURE: Any reasonably good loamy soil and a warm, sunny aspect.

PROPAGATION: By seeds sown in spring; cuttings made from half-ripened growths in summer.

SPECIES CULTIVATED: *S. syriaca*, yellow, 9 to 12 in., summer, Crete.

Sigmatostalix—*Orchidaceae*. Small growing, small flowered epiphytic orchids. Pseudo-bulbs usually two-leaved, scapes from their base, free-flowering.

CULTURE: Compost, as for *Odontoglossums*. Small pans suit many, but *S. radicans* and others with extending rhizomes should be placed on a raft or piece of tree fern stem. All may be suspended near the glass, with shading. Temp. around 60° and a moist atmosphere should be given throughout the year. A decided winter rest should not be given.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection—*S. Eliae*, small, many, yellow, spotted brown, summer to autumn, Peru; *guatemalensis* (syn. *S. costaricensis*), greenish red-brown, yellowish, lip bright yellow and rich red-brown, autumn, Guatemala, Costa Rica; *radicans*, 10 to 15, greenish-white, shaded yellow, lip white with yellow disk, various, Brazil.

Silene (Catchfly)—*Caryophyllaceae*. Hardy annuals, biennials and herbaceous perennials.

CULTURE OF ANNUAL AND BIENNIAL SPECIES: Soil, ordinary light or sandy. Position, sunny beds or borders. Sow seeds in Aug. or Sept., $\frac{1}{8}$ in. deep, in a bed of light, rich soil, transplanting seedlings when 1 in. high 2 to 3 in. apart; and plant 6 in. apart in flowering position in March for spring blooming. Sow also in similar depth and position in April, transplanting when 1 in. high to flowering positions for summer blooming. Or sow where required to grow and flower in April, thinning out seedlings in May or June to 6 in. apart.

CULTURE OF PERENNIAL SPECIES: Soil, sandy loam enriched with decayed cow dung. One-third loam, one-third peat, one-third stones for *S. Elizabethae*, *acaulis* and *rupestris*; ordinary soil for other kinds. Position, sunny crevices or ledges of rockeries for *S. acaulis*, *alpestris*, *rupestris*, *virginica*, *pennsylvanica* and *Elizabethae*; open borders for *S. maritima flore-pleno*. Plant, March or April. Lift and replant only when absolutely necessary.

PROPAGATION: Perennials by seeds sown in pans or boxes of sandy loam and leaf-mould, lightly covered with fine mould, and placed in cold frame in March or April; cuttings of young shoots inserted in sandy loam in cold frame in summer; division in March or April.

ANNUAL SPECIES CULTIVATED: *S. Armeria*, pink, summer, 1 to 2 ft., S. Europe; *Asterias*, pink, summer, 12 to 18 in., Macedonia and Romania; *pendula*, pink, spring, 6 in., Medit. Region, and many vars.

BIENNIAL SPECIES CULTIVATED: *S. compacta*, pink, summer, 18 in., Asia Minor; *rupestris*, white, May, 4 to 6 in., Alps.

PERENNIAL SPECIES CULTIVATED: *S. acaulis*, 'Cushion Pink', 'Moss Champion', pink, June, 2 in., N. Temp. Zone, and var. *alba*, white; *alpestris* (syn. *Heliosperma alpestre*), 'Alpine Catchfly', white, May, 6 in., Alps; *californica*, deep scarlet, late summer, 9 to 12 in., California; *caroliniana* (syn. *S. pensylvanica*), 'Wild Pink', pink, spring, 6 to 8 in., U.S.A.; *Elisabethae*, crimson-magenta, summer, 6 to 9 in., Tyrol; *Fortunei*, pink, June to Sept., 1½ ft., China; *Hookeri*, pink and white, summer, 2 in., California; *laciniata*, scarlet, summer, 8 to 10 in., N.W. America; *maritima* var. *flore-pleno*, 'Witch's Thimble', white, double, summer, trailing, Europe; *Pumilio*, rose pink, summer, 2 to 3 in., Tyrol; *pusilla*, white, summer, 2 to 3 in., habitat unknown; *quadridentata* (syns. *S. monachorum*, *Heliosperma quadrifidum*), white, summer, 2 to 6 in., Europe; *Saxifraga*, white and brown, summer, 6 in., S. Alps; *Schafta*, purple, summer, 4 to 6 in., Caucasus; *vallesia*, white and brownish-red, summer, 3 to 4 in., Europe; *virginica*, 'Fire Pink', crimson, June, 12 to 18 in., N. America.

Silk Cotton Tree, see *Ceiba pentandra*; **-Oak**, see *Grevillea robusta*; **-Vine**, see *Periploca*; **-weed**, see *Asclepias*.

Silphium—*Compositae*. Hardy perennials.

CULTURE: Soil, ordinary. Position, sunny borders. Plant, Oct. to April. Lift, divide and replant every two or three years.

PROPAGATION: By division of roots, Oct. or March.

SPECIES CULTIVATED: *S. laciniatum*, 'Compass Plant', yellow, Aug. to Sept., 6 to 8 ft., N. America; *perfoliatum*, 'Cup Plant', yellow, Aug. to Sept., 6 to 8 ft., N. America.

Silver Bell Tree, see *Halesia*; **-berry**, see *Elaeagnus commutata*; **-Bush**, see *Anthyllis Barba-Jovis*; **-Ferns**, see *Pityrogramma*; **-Wattle**, see *Acacia decurrens* var. *dealbata*.

Silybum—*Compositae*. Hardy annual or biennial herb. Leaves, large, variegated with broad white veins.

CULTURE: Soil, ordinary. Position, open borders. Sow seeds ½ in. deep in March where plants are to grow, thinning or transplanting seedlings to 2 ft. apart when large enough to handle.

SPECIES CULTIVATED: *S. Marianum*, 'Holy', 'Our Lady's' or 'Milk Thistle', rose-purple, summer, 1 to 4 ft., Medit. Region.

Sinarundinaria—*Gramineae*. Erect, clump-forming, bamboo-like shrubs. Sometimes included in *Arundinaria*.

CULTURE: Soil, good, not too heavy and of reasonable depth. Position, must be sheltered from cold winds, and dry root conditions are disliked.

PROPAGATION: By division in April and May.

SPECIES CULTIVATED: *S. Murielae*, yellow stems with waxy bloom when young, to 8 ft., China; *nitida*, purple stems, hardy, quick growing, 8 ft., China.

Sinningia—*Gesneriaceae*. Stove tuberous-rooted deciduous flowering plant. First introduced early nineteenth century.

CULTURE: Compost, equal parts fibrous peat, fibrous loam, leaf-mould, well-decayed manure, and a little silver sand. Position, well-drained pots close to glass in plant stove while growing; greenhouse or conservatory when in flower. Pot, Jan., Feb. or March. Place tubers singly, and just below surface, in 3 or

4 in. pots, shifting into 5 or 6 in. pots when they have started growth. Water moderately till growth is well advanced, then freely. Apply weak liquid manure when flowers show. After flowering gradually withhold water till foliage dies down, then keep quite dry till potting time. Temp., Jan. to Oct. 65° to 75°, Oct. to Jan. 50° to 55°.

PROPAGATION: By seeds sown on surface of fine sandy peat and leaf-mould in well-drained pots or pans in temp. 65° to 75° in March; cuttings of shoots, 1 to 2 in. long, inserted in small pots of sandy peat under bell-glass in temp. of 65° to 75°; young leaves with stalk inserted in small pots of sandy soil treated as cuttings; matured leaves with mid-ribs cut and laid on surface of sandy peat in temp. 55° to 75°.

SPECIES CULTIVATED: *S. Concinna*, purple and white, Feb., 3 ft., Burma; *Helleri*, white, spotted red, June to July, 6 to 12 in., Brazil; *speciosa* (syn. *Gloxinia speciosa*), 'Gloxinia', violet, autumn, 6 to 12 in., Brazil. Parent of the lovely strains of Gloxinias grown in gardens.

Siphonosmanthus—*Oleaceae*. Evergreen shrubs, formerly included in the genus *Osmanthus* but having botanical differences.

CULTURE: As *Osmanthus*.

PROPAGATION: As *Osmanthus*.

SPECIES CULTIVATED: *S. Delavayi* (syn. *Osmanthus Delavayi*), white, fragrant, April, 5 to 10 ft., China; *suavis*, white, midwinter, 12 ft., N. India.

Sisal Hemp, see *Agave sisalana*.

Sisyrinchium (Satin-flower)—*Iridaceae*. Hardy and half-hardy perennials. First introduced late seventeenth century.

CULTURE: Soil, two parts sandy loam, one part peat. Position, sunny, sheltered rock gardens. *S. californicum* does best in moist soil. Plant, Oct. or May.

PROPAGATION: By offsets, removed and potted in March; seeds.

SPECIES CULTIVATED: *S. angustifolium* (syn. *S. anceps*), blue, summer, 6 to 8 in., N. America; *Bermudiana*, blue, summer, 12 to 15 in., Bermuda; *californicum*, yellow, June, 12 in., California, rather tender; *chilense*, white and mauve, June, 9 in., America; *Douglasii*, 'Spring Bell', 'Rush Lily', purple, spring, 1 ft., N.W. America, and var. *album*, white; *filifolium*, 'Pale Maidens', white, May, 6 in., Falkland Islands; *striatum*, yellow, veined purple, June, 1 to 2 ft., Argentine.

Sitcha Waterleaf, see *Romanzoffia sitchensis*.

Sium (Skirret)—*Umbelliferae*. Hardy esculent-rooted perennial. Cylindrical, clustered, white, sweet-flavoured roots. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary fine, rich, deeply trenched, free from stones. Position, sunny, open. Sow seeds in groups of three or four, 12 in. apart, in drills $\frac{1}{2}$ in. deep and 18 in. apart in April. Thin seedlings when 3 in. high to one in each group. Remove flower heads as soon as seen. Lift the roots in Oct., twist off their leaves, and store in layers with sand or soil between in cellar or outhouse until required for cooking. Artificial manures: 2½ lb. kainit, 1 lb. sulphate of ammonia, 2½ lb. of guano, mixed, per square rod (30½ square yards), applied before sowing in spring. Requires to be raised from seed annually for producing roots for culinary purposes.

SPECIES CULTIVATED: *S. Sisarum*, white, Aug., 1 ft., E. Asia.

Skimmia—*Rutaceae*. Hardy evergreen berry-bearing shrubs with ornamental foliage. Flowers, inconspicuous but fragrant. Some species, notably *S. japonica* and *S. Laureola*, produce male and female flowers on separate plants. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary, but not shallow and dry. Position, part shade or full sun, good for exposed positions. Plant, Sept., Oct., March or April.

PROPAGATION: By seeds sown when ripe in sandy loam and peat in cold frame; cuttings of firm shoots inserted under bell-glass in temp. 55° to 65° in spring or summer; layering shoots in autumn.

SPECIES CULTIVATED: *S. Foremanii*, white, spring, 3 ft., hybrid with hermaphrodite flowers; *japonica* (syn. *S. oblata*), white, April, 3 to 4 ft., spreading, Japan, and var. *fragrans*, large panicles, fragrant male flowers; *Laureola*, yellow, spring, 2 to 3 ft., Himalaya; *Reevesiana* (syn. *S. Fortunei*), white, April, 2 ft., crimson pear-shaped fruits, China, and var. *rubella*, flowers pink, fragrant, male.

Skirret, see *Sium Sisarum*.

Skull Cap, see *Scutellaria*.

Slipper Flower, see *Calceolaria* and *Pedilanthus tithymaloides*.

Slippery Elm, see *Ulmus fulva*.

Sloe, see *Prunus spinosa*.

Smilacina—*Liliaceae*. Hardy perennials. First introduced early seventeenth century.

CULTURE: Soil, ordinary light, deep rich. Position, partially shady, moist shrubberies, woodlands, banks or borders. Plant, Oct., March.

PROPAGATION: By division of roots, Oct., March.

SPECIES CULTIVATED: *S. racemosa*, 'False Spikenard', white, May, 3 ft., N. America; *stellata*, 'Star-flowered Lily of the Valley', white, May, 2 ft., N. America. See also *Maianthemum* and *Clintonia*.

Smilax (Sarsaparilla Plant; Greenbriar)—*Liliaceae*. Hardy, half-hardy and stove evergreen and deciduous climbers. Shrubby and herbaceous. The Smilax of florists is *Asparagus asparagoides*. The sarsaparilla of commerce is yielded by the tuberous roots of several Trop. American species. First introduced mid-seventeenth century.

CULTURE OF STOVE SPECIES: Compost, light loam, leaf-mould and sand. Position, well-drained pots or borders in warm greenhouse, with shoots trained up wall or rafters. Water freely during growing season, moderately other times. Temp., March to Sept. 70° to 80°, Sept. to March 60° to 65°. Pot, Feb. or March.

CULTURE OF SHRUBBY SPECIES: Soil, ordinary. Position, sunny walls, arbours, trellises or banks. Plant, Sept. or Oct., March or April.

CULTURE OF HERBACEOUS SPECIES: Soil, ordinary. Position, sunny borders, with shoots trained to fences or rustic poles. Cut back dead shoots in autumn. Plant, March or April.

PROPAGATION: By division of roots at planting or potting time.

STOVE SPECIES CULTIVATED: *S. argyrea*, bright green leaves with white spots, climber, Peru; *australis*, white, 5 ft., Australia; *officinalis*, shining green leathery leaves, climber, Colombia.

SHRUBBY SPECIES CULTIVATED: *S. aspera*, 'Prickly Ivy', pale green, fragrant, July, 10 to 15 ft., evergreen, Medit. Region, and var. *maculata*, leaves blotched white; *Bona-Nox*, 'Stretchberry', greenish-white, 5 to 10 ft., Southern U.S.A.; *Cantab*, 'Cambridge Smilax', greenish, 12 ft., climber, probably a native of N. America; *China*, 'China Root', greenish-yellow, red berries, deciduous, 20 to 30 ft., China and Japan; *excelsa*, greenish-white, climber, S.W. Europe and W. Asia; *glauca*, green, black berries, tall climber, semi-evergreen, Eastern U.S.A.; *pseudo-china*, 'China Briar', dark green, 10 ft., climber, requires shelter, Southern U.S.A.; *rotundifolia*, greenish-yellow, black berries, to 25 ft., nearly evergreen, Eastern N. America.

HERBACEOUS SPECIES CULTIVATED: *S. herbacea*, greenish, bluish-black fruits, twining or semi-erect, N. America.

Smithiantha—*Gesneriaceae*. Stove tuberous-rooted herbaceous flowering perennials. Heart-shaped, green or crimson, velvety leaves. Formerly known as *Naegelia*. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous peat, one part loam, one part leaf-mould, with a little decayed manure and silver sand. Position, well-drained pots or pans in shady part of plant stove. Pot, March to flower in summer; May to flower in autumn; June to flower in winter. Plant tubers, 1 in. deep, singly in 5 in. pots,

or 1 to 2 in. apart in larger sizes. Water moderately from time growth begins until plants are 3 or 4 in. high, then freely. After flowering gradually withhold water till foliage dies down, then keep dry till potting time. Apply weak liquid manure once or twice a week when flower buds show. Syringing not required. Temp., March to Sept. 65° to 85°, Sept. to March 55° to 75°. Store, when foliage has decayed, on their sides under stage till potting time in temp. of 50° to 55°.

PROPAGATION: By seeds sown on surface of well-drained pots of sandy peat, in temp. 75°, March or April; cuttings of young shoots inserted in pots of sandy peat in temp. 75° to 85° in spring; division of rhizomes at potting time.

SPECIES CULTIVATED: *S. cinnabarina* (syn. *Gesneria cinnabarina*), scarlet, summer, 2 ft., Mexico; *multiflora* (syn. *Gesneria amabilis*), white, Aug., 1½ ft., Mexico; *zebrina*, yellow and scarlet, Oct., 2 ft., Mexico.

Smoketree, see *Cotinus Coggygria*.

Snail Flower, see *Phaseolus Caracalla*.

Snake Gourd, see *Trichosanthes Anguina*; **-root**, see *Cimicifuga racemosa*.

Snapdragon, see *Antirrhinum*.

Sneeze -weed, see *Helenium*; **-wort**, see *Achillea Ptarmica*.

Snowball Cactus, see *Pediocactus Simpsonii*; **-Tree**, see *Viburnum Opulus* var. *roseum*.

Snowberry Tree, see *Symphoricarpos albus*.

Snowdrop, see *Galanthus*; **-Tree**, see *Halesia*; **-Windflower**, see *Anemone sylvestris*.

Snowflake, see *Leucojum*.

Snow-in-summer, see *Cerastium tomentosum*.

Snow-on-the-mountain, see *Arabis albida*.

Snowy Mespilus, see *Amelanchier canadensis*.

Soap Plant, see *Chlorogalum pomeridianum*; **-wort**, see *Saponaria*.

Sobralia—*Orchidaceae*. A rather large, chiefly terrestrial, genus, with stiff leafy stems, set closely, varying in height, roots not tuberous. Flowers terminal in most, often five or six in succession from a thickened terminal head. In others the inflorescence is racemose, in a few lateral. In a number, though the individual flowers last but a few days, they are large and very handsome, not unlike a large *Cattleya* flower in shape.

CULTURE: All may be treated as terrestrials. Compost, rough fibrous loam, with about one-quarter of sphagnum moss and osmunda fibre or peat mixed with crushed crocks. Drainage, ample. Pots, fairly large. Water liberally in summer, less frequently in winter, but the compost should never get really dry. The intermediate house is suitable; winter temp. about 60°, higher in summer; shade and syringe; give full light in autumn.

PROPAGATION: By division of plants in early spring.

SPECIES CULTIVATED: A selection—*S. Cattleya*, purplish-brown, lip purplish, keels yellow, lateral, 12 ft. or more high, autumn, Colombia; *Charlesworthii* (syn. *E. Ruckeri*), racemose, larger, rose-purple, lip yellow and intense purple, 3 to 4 ft. high, summer, Colombia; *leucoxantha*, successive, large, creamy white, lip shaded yellow and orange, 2 to 5 ft., high, summer, Guatemala, Costa Rica; *liliastrum* (syn. *S. Elizabethae*), racemose, white or rose flushed, lip with yellow disk, 6 to 10 ft. high, winter, spring, Brazil, British Guiana, var. *rosea*, rose, lip with white veins; *Louii*, successive, purple-rose, 1 to 3 ft. high, summer, Colombia; *macrantha*, successive, large, crimson-purple, lip with whitish throat and yellowish disk, very variable, 3 to 8 ft., high, summer, Mexico, Guatemala; *Ruckeri*, racemose, rose-purple, lip purple-crimson, summer, autumn, Colombia; *Sanderac*, sulphur-white, near *leucoxantha*, Cent. America; *violacea*, successive, fragrant,

violet or violet-rose, keels on lip, yellow, 3 ft. high, autumn, Colombia, Peru; *violacea alba*, white, lip orange on throat and disk; *xantholeuca*, successive, creamy yellow, lip deep yellow, throat of lip brownish, 3 to 8 ft. high, summer, Cent. America. Several hybrids have been raised and some natural hybrids are strongly suspected.

Soja, see Glycine.

Solandra—*Solanaceae*. Stove climbing flowering shrubs. First introduced late eighteenth century.

CULTURE: Compost, two parts sandy loam, one part equal proportions fibrous peat and dry cow manure, and little sand. Position, pots or beds, with shoots trained up rafters or round trellises. Pot or plant, Feb. or March. Water freely April to Oct. Keep almost dry remainder of time. Syringe daily April to Sept. Prune weak shoots moderately closely and remove tips of stronger ones in Feb. Temp., Oct. to March 50° to 55°, March to Oct. 65° to 85°.

PROPAGATION: By cuttings inserted in light soil in coconut-fibre refuse in temp. of 65° to 75° in spring.

SPECIES CULTIVATED: *S. grandiflora*, 'Peach Trumpet Flower', cream and purple, spring, 10 to 15 ft., Trop. America; *longiflora*, white and purple, autumn, 4 to 6 ft., W. Indies; *nitida* (syn. *S. Hartwegii*), yellow, winter, 15 ft., Mexico; *viridiflora*, green, summer, 2 to 3 ft., Brazil.

Solanum—*Solanaceae*. A large genus including greenhouse and half-hardy flowering, berry-bearing and ornamental-leaved plants or shrubs, and vegetable and medicinal plants. Potato and Egg Plant first introduced late sixteenth century.

CULTURE OF THE POTATO: Classification—Kidney, oblong, white or coloured; round, roundish, white or coloured; pebble-shaped, flattish oblong, white or coloured. First earlies, varieties maturing in June; second earlies, varieties maturing in July and Aug.; late or maincrop, varieties maturing in Sept. and Oct. Soil, deep rich loam, or any kind except very heavy clay or bogland. Light soils best for very early crops. Dress at planting time with a balanced fertiliser. Position, sloping borders facing south for earlies, and open garden for second early and main crops. Never plant sets direct on farmyard manure in drills. If applied in spring, cover slightly with soil. Seaweed an excellent manure if dug in in autumn. Sets for planting: Best average size, 1½ to 2 in. wide and 3 in. long; weight, 2 to 3 oz. Larger tubers to be divided into three or four parts, each furnished with one good eye. Treatment of sets: Place tubers close together, eyed end suppermost, in shallow boxes in a cool, light spot early in the year, and allow each tuber to develop two strong shoots only, rubbing off all others. Plant early kinds in Feb., protecting young growth with straw if necessary; second earlies in March; maincrop in April. Draw drills 6 in. deep on heavy, and 7 in. deep on light soils. Rows to run north and south if possible, and be 15 in. apart for first earlies; 2½ ft. for second earlies; and 3½ ft. for late kinds. Distances apart for early kinds, 6 to 8 in.; 1 ft. for medium growers; 1½ ft. for robust kinds. Never plant with a dibber. Fork or stir up soil between rows when shoots are 6 in. high; earth up when 6 to 8 in. high. Lift crop when haulm assumes a yellowish tinge. Avoid exposing tubers for eating too long to the light. Store in clamps in the open air or in cool cellars or dark sheds. Tubers for seed store in boxes, as above advised, in light, frost-proof position. Quantities of seed required: from 8 to 14 lb. per 100 ft. row, according to variety.

FORCING IN POTS: Compost, two parts loam and one part leaf-mould. Place one large crock over drainage hole, then add 2 in. of turf and enough compost to half-fill a 10 in. pot. Place one tuber in centre and fill pot to rim with soil pressed down moderately firmly. Place pots in temp. of 55°. Water carefully till shoots appear, then keep soil uniformly moist. When shoots are 6 in. high fill up remaining space in pot with compost. Increase temp. to 65° and feed twice a week with liquid manure. Expose plants fully to light. Time to plant, Jan. Crop ready for use in April or May.

CULTURE IN FRAMES: Early crops may be grown in frames on hotbeds or with-

out heat. Compost, two parts good loam, one part well-rotted manure or leaf-mould, with a little wood ashes and bonemeal added. Depth of compost, 1 ft. Surface of soil from glass, 1 ft. Plant sets 1 ft. apart in rows 15 in. asunder; tubers, 4 in. deep. Time to plant, Feb. Earth up when 6 in. high. Give air when sun is shining. Keep soil uniformly moist, using tepid water. Protect frames at night in cold weather by means of mats or litter. Crop ready for use in May.

CULTURE OF AUBERGINE (EGG PLANT): Sow seed in well-drained pots Feb. to March, in temp. around 55°. Pot singly in small pots when sufficiently large, keep well syringed. Pot on to 5 or 6 in. pots in April, May, and in June move to cool house or conservatory. Water generously. Pinch out growing tip of plant when 6 in. high. Give air freely during blossoming period and eventually thin fruits to three or four per plant. In a warm season they will fruit freely out of doors beneath a sunny, sheltered wall. The purple- and black-fruited kinds are the best for culinary purposes.

CULTURE OF BERRY-BEARING SPECIES: Compost, equal parts loam, leaf-mould and silver sand. Pot, Feb. or March. Syringe daily, water freely, and grow in temp. of 55° to 65°. Pinch off points of shoots when 3 in. long. Transfer to cold frame in June, syringe morning and evening, and keep well watered. When berries set, give liquid manure twice a week. Admit air freely after first week. Remove to greenhouse middle of Sept. and grow in a temp. of 55°. Prune shoots back to 2 in. in Feb., and when new growth begins repot and grow as before. May also be planted outdoors in rich soil early in June, points of shoots removed early in July, and plants carefully lifted, potted and placed stood in shady, cold frame for a fortnight, then removed to greenhouse.

CULTURE OF CLIMBING SPECIES: Soil, loam, leaf-mould and silver sand. Position, pots, beds or tubs, shoots trained up rafters of greenhouse. *S. crispum* requires wall protection except in south, where it may be grown as a rampant bush. *S. jasminoides* will also thrive in the open in the south-west. Plant or pot in March. Prune away weak growths and shorten soft points of other shoots in Feb. Water indoor plants freely in spring and summer, moderately in autumn and winter. Temp., *S. Seaforthianum* and *S. Wendlandii*, Sept. to March 55° to 60°, March to Sept. 65° to 75°. *S. crispum* and *S. jasminoides* only require protection from frost.

CULTURE OF ORNAMENTAL-LEAVED SPECIES: Soil, ordinary. Position, sunny beds or borders. Plant out in June. Sow seeds annually in light soil in temp. of 75° in spring, grow seedlings on in pots in heat till May, then harden for planting out in June.

PROPAGATION: Berry-bearing species by seeds sown in temp. 65° to 75° in Feb., transplanting seedlings into small pots, and removing points of shoots when 3 in. high and later transferring to 5 in. pots. When shoots are 3 in. long remove their points, then allow them to grow naturally. From June onwards treat as advised for plants; also increased by cuttings inserted in sandy soil in temp. of 65° in spring, afterwards treating rooted cuttings as advised for seedlings. Climbing species by cuttings of young shoots in sandy soil under bell-glass, during Aug. or Sept. Ornamental-leaved species by seeds as above.

TUBEROUS-ROOTED SPECIES CULTIVATED: *S. tuberosum*, 'Potato', white, violet, etc., summer.

FRUIT-BEARING SPECIES CULTIVATED: *S. Melongena*, 'Aubergine', 'Andes' or 'Egg Plant', flowers blue, summer, 2 to 3 ft., fruit egg-shaped, white, yellow or purple, Tropics, var. *esculentum*.

BERRY-BEARING SPECIES CULTIVATED: *S. Capsicastrum*, 'Star Capsicum', 'Winter Cherry', flowers white, summer, fruits scarlet, winter, 1 to 2 ft., Brazil; *Pseudo-Capsicum*, 'Jerusalem Cherry', white, summer, fruits scarlet or yellow, 2 to 4 ft., habitat uncertain, greenhouse evergreen shrubs. Wetherill's hybrids are the result of crosses between the two species.

CLIMBING SPECIES CULTIVATED: *S. crispum*, bluish-purple, fragrant, June to Sept., bush or climber, rampant, stands hard pruning, 15 to 25 ft., China, var. *autumnalis*, less strong, deeper colour, from May to Sept.; *jasminoides*, 'Jasmine Nightshade', blue, summer, 15 to 20 ft., Brazil, var. *album*, white flowered,

both lovely rampant climbers, rather tender; *Seaforthianum*, blue or purple, summer, 10 to 15 ft., Trop. America; *Wendlandii*, lilac and blue, summer, 15 to 20 ft.

ORNAMENTAL-LEAVED SPECIES CULTIVATED: *S. atropurpureum*, stems purplish, mid-ribs white, leaves prickly, Brazil; *marginatum*, stems woolly and prickly, leaves prickly, white beneath, green above and margined with white, N. Africa and Costa Rica; *robustum*, stems woolly, leaves velvety above, woolly beneath, and spiny, Brazil; *Warscewiczii*, stems hairy, red, and prickly, leaves green, mid-ribs prickly, S. America, shrubs, but best grown as half-hardy annuals.

Soldanella (Blue Moon-wort)—*Primulaceae*. Hardy perennial herbs. First introduced mid-seventeenth century.

CULTURE: Compost, equal parts peat and loam, with sharp sand. Position, sheltered, open, moist rockery. Plant, March or April. Mulch surface of soil in dry weather with leaf-mould.

PROPAGATION: By seeds sown in well-drained pans filled with equal parts sandy loam, peat and sand, lightly covered with fine soil and placed in a cold, shady frame, March or April; division of plants in March or April.

SPECIES CULTIVATED: *S. alpina*, blue, April and May, 3 in., Alps; *Ganderi*, palest lilac, March, 2 in., hybrid; *minima*, lilac and purple, April, 2 in., Europe; *montana*, lavender, April, 6 to 9 in., E. Europe; *neglecta*, lilac, spring, 3 to 4 in., hybrid; *pindicola*, lavender, spring, 3 in., Balkans; *pusilla*, pale lilac, April, 2 to 4 in., Alps.

Solidago (Golden Rod)—*Compositae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary. Position, sunny or shady borders or banks or margins of water. Plant, Oct. or March. Lift, divide and replant every three or four years.

PROPAGATION: By division of roots, Oct. or March; seeds sown outdoors in April.

SPECIES CULTIVATED: *S. brachystachys*, yellow, autumn, 6 to 12 in.; *canadensis*, yellow, Aug., 4 to 6 ft., N. America; *graminifolia* (syn. *S. lanceolata*), yellow, Sept., 2 to 4 ft., N. America; *virgaurea*, 'Common Golden Rod', yellow, Aug., 2 to 3 ft., Europe (Br.).

× **Solidaster**—*Compositae*. A bigeneric hybrid of horticultural origin between *Aster plarimicoides* and an unknown species of *Solidago*.

CULTURE: As *Solidago*.

PROPAGATION: As *Solidago*.

SPECIES CULTIVATED: *S. luteus* (syns. *Aster hybridus luteus* and *Solidago missouriensis* hort.), yellow, Aug., 2½ ft., scabrous.

Sollya—*Pittosporaceae*. Greenhouse evergreen twining shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts peat, one part turfy loam, and half a part silver sand. Position, well-drained pots or beds, with shoots trained to wire trellis or up rafters or pillars. Pot, Feb. or March. Water freely April to Sept., moderately afterwards. Syringe daily April to Aug. Shade not necessary. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By cuttings of shoots inserted in sand under bell-glass in temp. 65° to 75° in spring or summer.

SPECIES CULTIVATED: *S. heterophylla*, 'Australian Bluebell Creeper', blue, July, 4 to 6 ft., Australia; *parviflora* (syn. *S. Drummondii*), blue, July, 4 to 6 ft., Australia.

Solomon's Seal, see *Polygonatum*.

Sonerila—*Melastomaceae*. Stove flowering perennial. Leaves, ovate or lanceolate, green or spotted with silvery white. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts fibrous peat, chopped sphagnum, charcoal and sand. Position, well-drained pots or pans fully exposed to light. Pot, Feb. or March. Water freely April to Sept., moderately afterwards. Shade from sun

and moist atmosphere essential. Temp., March to Sept. 70° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By seeds sown in above compost and lightly covered with fine soil, Jan. to April, in a temp. of 75° to 85°; cuttings inserted in small pots under bell-glass in temp. 75° to 85°, Jan. to May.

SPECIES CULTIVATED: *S. argentea*, lilac-rose, leaves silvery grey, origin unknown; *margaritacea*, rose, summer, leaves white and green above, purplish beneath, Burma. There are numerous vars.

Sophora—*Leguminosae*. Hardy and slightly tender evergreen and deciduous shrubs and trees. Attractive pinnate foliage and ornamental flowers. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary well-drained loam. Position, warm, with full sun. Some species require wall protection in all but warmest districts.

PROPAGATION: By seed sown in well-drained pots or boxes in a cold frame in March or April, or in gentle heat in Feb. Shrubby kinds by cuttings of half-ripened young shoots in shaded frame or under bell-glass, Aug. to Sept., or by layers, Oct. to Nov.

SPECIES CULTIVATED: *S. affinis*, hardy, white, tinged pink, summer, 12 to 18 ft., Arkansas and Texas; *japonica*, 'Japanese Pagoda Tree', creamy white, Sept., young trees not flowering, 50 to 75 ft., China, with vars. *variegata*, leaves margined creamy white, and *violacea*, flowers rosy violet, all hardy; *macrocarpa*, evergreen, rather tender, yellow, June, 20 to 30 ft., Chile; *microphylla*, evergreen, yellow, June, 8 to 12 ft., New Zealand and Chile, var. *prostrata*, dwarf habit, both rather tender; *tetraptera*, 'Kowhai', golden yellow, May to June, 15 to 25 ft. for warmer districts, New Zealand and Chile, with var. *grandiflora*, the best form, both evergreen in sheltered places; *viciifolia*, blue and white, June, hardy, 6 to 8 ft., attractive shrub, China.

× **Sophrocattleya**—*Orchidaceae*. Bigeneric hybrids between the genera *Sophronitis* and *Cattleya*.

× **Sophrolaelia**—*Orchidaceae*. Bigeneric hybrids between the genera *Sophronitis* and *Laelia*.

× **Sophrolaeliocattleya**—*Orchidaceae*. Trigeneric hybrids between the genera *Sophronitis* and *Laeliocattleya*.

Sophronitis—*Orchidaceae*. About eight dwarf-growing, pretty epiphytes, allied to *Cattleyas*. Pseudo-bulbs usually small, one-leaved, stout, with one or few terminal flowers.

CULTURE: Compost, as for *Cattleyas*, but finely cut. Pans, well drained, which can be suspended, preferable to pots. The temp. and atmosphere for *Odontoglossums* suit during summer. Winter growths and flowers are often produced with *S. coccinea* which should have 55° at night in winter. Infrequent waterings are needed during winter but the compost should not become really dry. Water freely when roots are active. Repot as growth commences, the period varies. Shade, but give full light in autumn.

PROPAGATION: The rhizomes branch and division can usually be made readily.

SPECIES CULTIVATED: *S. cernua*, small, cinnabar-red, lip paler at base, winter, spring, Brazil; *coccinea* (syn. *S. grandiflora*), comparatively large, variable, beautiful, flower 1 or 2 up to 3 in. across, bright scarlet, lip yellowish, red streaked, winter, spring, Brazil; *Lowii*, often placed as a var. of *S. coccinea*, smaller, dark chrome yellow, winter, Brazil; *pterocarpa*, near *S. cernua* in size and colour, perhaps synonymous, winter, Brazil; *violacea*, purple-violet, winter, Brazil.

Sorbaria (False Spiraea)—*Rosaceae*. Hardy deciduous shrubs, formerly included in *Spiraea*.

CULTURE: Soil, moist rich. Position, open sunny borders. *S. Aitchisonii* and *S. tomentosa* should have young wood shortened back, but may retain framework of old wood in March.

PROPAGATION: By seed; suckers; cuttings of ripe wood; root cuttings.

SPECIES CULTIVATED: *S. Aitchisonii* (syn. *Spiraea Aitchisonii*), white, July to Aug., 8 to 10 ft., W. Asia; *arborea*, white, to 18 ft., China; *sorbifolia*, white, July to Aug., 3 to 6 ft., N. Asia, Japan; *tomentosa* (syns. *S. Lindleyana*, *Spiraea Lindleyana*), white, July to Sept., 12 to 20 ft., Himalaya.

Sorbus—*Rosaceae*. Hardy deciduous ornamental trees with autumn berries, formerly included in *Pyrus*.

CULTURE: Soil, ordinary well drained. Position, sunny borders or as isolated lawn specimens, thrive in chalky soil. Plant, Nov. to Feb.

PROPAGATION: By seeds sown when ripe, or stratified; layers; rare kinds by budding or grafting on stocks of *S. Aucuparia*.

SPECIES CULTIVATED: *S. Aria* (syn. *Pyrus Aria*), 'Whitebeam', flowers dull white, May, red berries, 30 to 50 ft., Europe, including Britain, with vars. *lutescens*, creamy white leaves, *majestica*, best form, grey leaves, scarlet fruits; *Aucuparia*, 'Mountain Ash', 'Rowan', white, May, scarlet fruits quickly eaten by birds, 30 to 50 ft., Europe and Asia, including Britain, many vars. including *fructu-luteo*, yellow fruited, *pendula*, weeping, *edulis*, larger fruits used for preserves; *commixta*, white, May, berries and foliage orange-red, Sept., upright habit, 15 to 25 ft., Japan, Korea; *discolor* (syn. *S. pekinensis*), white, May, brilliant autumn tints, white berries, 25 to 30 ft., N. China; *domestica* (syn. *Pyrus Sorbus*), 'Service Tree', white, May, fruit green tinged red, 30 to 60 ft., S. and E. Europe; *Folgnieri*, white, June, scarlet fruits, graceful habit, 15 to 20 ft., Cent. China; *Hostii*, natural hybrid, pale pink, June, 8 to 12 ft., Cent. Europe; *hupehensis*, white, May, white berries pink starred, brilliant autumn tints, 15 to 25 ft., W. China; *hybrida* (syn. *Pyrus pinnatifida*), white, May, round red fruits, natural hybrid, with vars. *fastigiata*, erect growing, *Gibbsii*, large clusters, bright fruits, and *Meinichii*, greyish leaves; *intermedia*, dull white, May, bright red berries, 20 to 40 ft., N. Europe, including Britain; *meliosmifolia*, attractive young growths, brownish-red fruits, 20 to 30 ft., W. China; *Sargentiana*, sticky terminal flower-buds, large bunches brilliant berries and good autumn tints, recent introduction, W. China; *scalaris*, grey leaves, reddish-brown berries, 10 to 15 ft., W. China; *tianshanica*, white, May, bright red fruits, 10 to 12 ft., Turkistan; *torminalis*, 'Wild Service Tree', white, June, oval brown fruits, 30 to 40 ft., Europe; *Vilmorinii*, grey fern-like leaves, pink and white berries, 10 to 15 ft., W. China.

Sorrel, see *Rumex*; **-Tree**, see *Oxydendrum arboreum*.

Sour Sop, see *Annona muricata*.

South African Harebell, see *Roella ciliata*.

Southern Beech, see *Nothofagus*; **-wood**, see *Artemisia Abrotanum*.

Sowbread, see *Cyclamen*.

Soybean or Soyabean, see *Glycine Max*.

Spanish Bayonet, see *Yucca aloifolia*; **-Broom**, see *Spartium junceum*; **-Chestnut**, see *Castanea sativa*; **-Iris**, see *Iris Xiphium*; **-Moss**, see *Tillandsia usneoides*; **-Oyster Plant**, see *Scolymus hispanicus*; **-Squill**, see *Scilla hispanica*.

Sparaxis (African Harlequin Flower)—*Iridaceae*. Half-hardy bulbous plants. First introduced mid-eighteenth century.

OUTDOOR CULTURE: Soil, light, rich sandy. Position, sunny well-drained border. Plant, Sept. to Jan., placing bulbs 4 in. deep and 2 in. apart. Mulch surface of bed in March with cow manure. Cover with litter during winter months if not planted in sheltered border.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed cow manure. Pots, 4½ in. in diameter, well drained. Place five bulbs, 3 in. deep, in each pot in Nov. and cover with leaf-mould in cold frame or under cool greenhouse stage until growth begins. Water moderately from time bulbs begin to grow until flowers fade, then gradually cease, keeping bulbs dry till Jan. Temp., Sept. to March 40° to 50°, other times 50° to 60°.

PROPAGATION: By offsets, treated as advised for bulbs.

SPECIES CULTIVATED: *S. grandiflora*, violet-purple, spring, 1 to 2 ft., S. Africa; *tricolor*, orange-yellow and black, May, 1 to 2 ft., S. Africa. For vars. see trade lists. See also the genus *Dierama*.

Sparmannia—*Tiliaceae*. Greenhouse evergreen shrub. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part peat, and little sand. Position, pots in light, airy greenhouse Sept. to June; sunny spot outdoors remainder of time. Pot, Feb. or March. Prune moderately close Nov. to Dec. Water copiously April to Oct., moderately afterwards. Apply stimulants April to Sept. No shade or syringing required. Temp., March to Sept. 55° to 65°, Sept. to March 40° to 50°.

PROPAGATION: By cuttings inserted singly in small pots filled with sandy soil under bell-glass in temp. 55° to 65°, spring or summer.

SPECIES CULTIVATED: *S. africana*, 'African Hemp', white, summer, 10 to 15 ft., S. Africa, var. *flore-pleno*, double flowered.

Spartium—*Leguminosae*. Hardy deciduous flowering shrub. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, sunny open borders or dry banks, excellent maritime shrub. Plant, Oct. to March. May be pruned, or even clipped if desired, in spring.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in drills in fine soil in sunny position outdoors, autumn or spring. Young plants should be pot grown until planted out.

SPECIES CULTIVATED: *S. junceum*, 'Spanish Broom', yellow, summer, 6 to 10 ft., S. Europe.

Spathiphyllum—*Araceae*. Stove evergreen perennials. First introduced mid-nineteenth century.

CULTURE: Compost, leaf-mould and peat with a little loam, sand and charcoal. Water freely during growing season, moderately at other times. Maintain a humid atmosphere throughout the year, using the syringe freely. Temp., March to Sept. 75° to 85°, Sept. to March 65° to 70°.

PROPAGATION: By seeds sown in temp. 85° during Feb.; or by division, Feb. or March.

SPECIES CULTIVATED: *S. cochlearispathum*, white, large leaves with waved margins, 2 to 3 ft., Cent. America; *floribundum*, white and yellowish, foliage rich green, 1 ft., Colombia; *Ortgiesii*, green and white, 1½ ft., Mexico; *Patinii*, white and greenish, pale green foliage, 1 ft., Colombia.

Spathoglottis—*Orchidaceae*. An eastern terrestrial genus, about forty species. Pseudo-bulbs corm-like on a creeping rhizome. Leaves 1 to 5, tall, often broadly grass-like, deciduous in some. Scapes from near base of bulbs, tall, slender, the flowering portion elongating, more or less. Flowers, often many, not very large, but bright in colour, front lobe of lip spreading.

CULTURE: Compost, fibrous loam, a small quantity of leaf-mould, sand and chopped sphagnum moss added. Pots, well drained. Deciduous species should have their rhizomes and pseudo-bulbs just covered with the compost, evergreen kinds placed on the top and firmly pressed in but not covered. All the kinds need a stove temp. and moist atmosphere with shading when growing, expose to light in autumn but retain the far eastern in the stove during winter. The deciduous or nearly deciduous require a more decided rest and a winter temp. of 60°, or a little less, as do the Burmese and Indian kinds.

PROPAGATION: By division of the plants in spring.

SPECIES CULTIVATED: A selection—*S. aurea*, bright yellow, often reddish behind, lip red-spotted at base, autumn, Malacca; *Fortunei*, deciduous, yellow, lip red-spotted and marked, autumn, Hong Kong; *gracilis*, near *S. aurea*, mid-lobe of lip haired at base, spring, Borneo; *ixioides*, near *S. Fortunei*, golden yellow, lip disk red-spotted, keels haired, summer, E. Himalaya; *Kimballiana*, near *S. aurea*, finer, larger, golden yellow, copper-red behind, red spots on bases of the lip lobes,

summer, Borneo; *Lobbii*, deciduous, sulphur-yellow, bases of lower sepals and lip marked red-brown, autumn, Burma; *plicata* (syn. *S. rosea*), variable, many, crowded, purplish or rose-purple, lip often whitish, summer, Malaya; *Vieillardii*, strong-growing, whitish, rose-flushed, many, comparatively large, variable, autumn, various, New Caledonia.

Spear Flower, see *Ardisia*; **-Grass**, see *Aciphylla*; **-Lily**, see *Doryanthes*; **-mint**, see *Mentha spicata*.

Specularia—*Campanulaceae*. Hardy annuals.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Sow seeds in April thinly $\frac{1}{16}$ in. deep in patches or lines where required to grow. Thin seedlings when 1 to 2 in. high to 3 to 6 in. apart. Support plants with small twigs when 3 to 6 in. high.

SPECIES CULTIVATED: *S. pentagonia* (syn. *Campanula pentagonia*), blue, summer, 1 ft., Asia Minor; *perfoliata*, blue, June, 12 to 18 in., N. America; *Speculum-Veneris* (syn. *Campanula Speculum*), 'Venus's Looking Glass', purple, summer, 1 ft., Europe. This genus was formerly known as *Legousia*.

Speedwell, see *Veronica*.

Spenceria—*Rosaceae*. Hardy perennial plants.

CULTURE: Soil, well-drained loam or scree mixture. Position, sunny pocket in the rock garden.

PROPAGATION: By seeds sown when ripe.

SPECIES CULTIVATED: *S. ramalana*, golden yellow, 12 in., July, Asia.

Sphaeralcea (Globe Mallow)—*Malvaceae*. Half-hardy perennial and greenhouse shrub. First introduced late eighteenth century.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny, dryish, sheltered banks or sheltered rock gardens. Plant, autumn or spring.

CULTURE OF SHRUBBY SPECIES: Compost, loam, leaf-mould and sand. Position, well-drained pots or borders in unheated greenhouse. Water freely during growth.

PROPAGATION: Perennial species by division at planting time; shrubby species by cuttings of young shoots inserted in sandy soil under bell-glass in gentle bottom heat.

SPECIES CULTIVATED: *S. angustifolia*, pink, Aug. to Sept., 3 to 4 ft., shrubby, Mexico; *Munroana*, bright scarlet, May to Nov., 1 to 2 ft., perennial, N. America.

Spice Bush, see *Lindera Benzoin*.

Spider Flower, see *Cleome spinosa*; **-wort**, see *Tradescantia*.

Spigelia—*Loganiaceae*. Hardy herbaceous perennial. First introduced late seventeenth century.

CULTURE: Soil, equal parts loam, leaf-mould, peat and sand. Position, partially shady border containing 2 ft. in depth of above compost. Plant, March or April. Water copiously during summer.

PROPAGATION: By division of roots, March or April.

SPECIES CULTIVATED: *S. marilandica*, 'Carolina Pink', 'Maryland Pink Root', red and yellow, summer, 1 ft., N. America.

Spike Heath, see *Bruckenthalia spiculifolia*; **-Rush**, see *Eleocharis*.

Spinach, see *Spinacia*; **New Zealand-**, see *Tetragonia expansa*; **-Beet**, see *Beta vulgaris* var. *Cicla*.

Spinacia—*Chenopodiaceae*. Hardy annual. Esculent-leaved vegetable. First introduced mid-sixteenth century.

CULTURE: Soil, deep, rich, moist ordinary for summer spinach; rich, moderately dry for winter kind. Position, sunny. Sow seeds of summer spinach at intervals of a fortnight, Feb. to May, in drills 1 in. deep and 12 in. apart; winter spinach, Aug. and Sept., in drills 1 in. deep and 15 in. asunder. Thin to 3 in. when large enough to handle then remove and use alternate plants. Seeds germinate in ten

to fifteen days; retain their germinating powers for five years. Crop reaches maturity eleven weeks after sowing.

SPECIES CULTIVATED: *S. oleracea*, 'Prickly-seeded' or 'Winter Spinach', S.W. Asia, var. *inermis*, 'Round-seeded' or 'Summer Spinach', S.E. Europe.

Spindle Tree, see *Euonymus europaeus*.

Spiraea—*Rosaceae*. Hardy deciduous flowering shrubs. Some species formerly included in this genus are now classified in *Astilbe*, *Aruncus*, *Filipendula*, *Holodiscus* and *Sorbaria*.

CULTURE: Soil, good ordinary or loamy. Position, open sunny borders or shrubberies. Plant, Sept. to March. Prune those which flower on young wood, such as *S. japonica*, *Bumalda*, 'Anthony Waterer', *Margaritae*, *Menziesii*, etc., to ground level in March. Those which flower early on one-year-old wood, such as *S. arguta*, *prunifolia* and *Thunbergii*, should be pruned hard immediately after flowering. The later-flowering species, *S. bracteata*, *canescens*, *Vanhouttei*, *trichocarpa* and *Veitchii* should have some of the older wood thinned out in winter.

PROPAGATION: By cuttings of young shoots in sandy soil under hand-light, or in frame, in shade during summer; offsets removed and planted in autumn.

SPECIES CULTIVATED: *S. arguta*, white, April to May, 5 to 7 ft., hybrid; *brachybotrys*, pale rose, June, 4 to 8 ft., hybrid; *bullata*, deep rose, July, 12 to 15 in., Japan; *Bumalda*, carmine, July to Aug., 18 in., hybrid; *canescens*, white, 6 to 10 ft., Himalaya; *cantonensis* (syn. *S. Reevesiana*), white, June, 4 to 6 ft., China and Japan, and var. *lanceata*, double flowers; *Chamaedrifolia*, white, June to July, 4 to 6 ft., E. Europe to Japan, var. *ulmifolia*, better form with larger flowers; *decumbens*, white, May, 3 to 8 in., S. Europe; *Douglasii*, purplish-rose, June to July, 4 to 6 ft., Western N. America; *Henryi*, cream, June, 6 to 8 ft., spreading, Cent. and W. China; *japonica* (syn. *S. callosa*), rosy red, July to Aug., 3 to 5 ft., Japan, China; *latifolia*, pale pink, June to July, 3 to 4 ft., Newfoundland and Canada; *Margaritae*, bright pink, July to Aug., 4 ft., hybrid; *Menziesii*, purplish-rose, July to Aug., 3 to 5 ft., Western N. America; *mollifolia*, white, June, 4 to 6 ft., silvery leaves, W. China; *nipponica* (syn. *S. bracteata*), pure white, June, 5 to 8 ft., Japan, var. *rotundifolia*, larger foliage and flowers; *prunifolia*, white, April to May, 6 ft., China, var. *plena*, double, autumn colouring; *salicifolia*, pink, June to July, 3 to 6 ft., spreading by suckers, S.E. Europe to N.E. Asia; *sanssouciana*, bright rose, July, 4 to 5 ft., hybrid; *Thunbergii*, white, March to April, 3 to 5 ft., China; *trichocarpa*, white, June, 4 to 6 ft., semi-weeping habit, Korea; *Vanhouttei*, white, June, 4 to 6 ft., hybrid; *Veitchii*, white, June, 10 to 12 ft., Cent. China; *Watsoniana*, rose, hybrid; *Wilsonii*, pure white, June to July, 6 to 8 ft., arching growths, Cent. and W. China.

Spiranthes—*Orchidaceae*. A large terrestrial genus, represented in Britain. Roots fleshy or thickened into tubers, stems erect, leafy or bracteate or without leaves when flowering. Flowers generally small, one-sided in the spikes or spiralled. Segments nearly equal, the upper sepal and petals hooded. Few species have appeared in cultivation.

CULTURE: With exotic species information should be obtained as to nature of soil, position and temp. If unknown, a compost of rough loam, peat, leaf-mould and sand should be made and the crown or tuber placed just beneath the surface. When dormant give infrequent waterings and a winter temp. about 60° to all from tropical countries, a higher temp. in summer with shading. British species require a similar compost to above with sometimes old mortar rubble added, but, if collected, a good ball of soil should be taken with them and both that and the position imitated as far as possible.

PROPAGATION: By division of crowns if more than one is present.

BRITISH AND EUROPEAN SPECIES CULTIVATED: *S. aestivalis*, small, white, summer, damp situation, height up to 15 in.; *Romanzoffiana*, white, fragrant, forming a spike 4 to 10 in. high, Ireland, Britain, N. America; *spiralis* (syn. *S. autumnalis*), small, white, one-sided, fragrant, summer, autumn, chalky soil.

EXOTIC SPECIES CULTIVATED: A selection—*S. acaulis*, greenish-white or white

within, variable, height 12 to 30 in., leaves rather large, green, with darker green markings, or whitish spots, spring, summer, Trop. America; *australis*, small, pinkish, lip white, summer, Europe to Australia; *bicolor*, white, with purplish streaks, height 1 to 3 ft., winter, W. Indies, Brazil; *cernua*, white, fragrant, spike cylindrical, N. America; *elata*, white or green shaded, spiralled, variable, summer, Trop. America; *gracilis*, white, spiralled, 12 to 18 in. high, N. America; *metallica*, green, lip whitish, leaves olive-green with paler spots, winter, spring, Brazil; *sauroglossum*, green, lip white, spike cylindrical, 2 to 3 ft. high.

Spire Lily, see *Galtonia*.

Spleenwort, see *Asplenium*.

Spondias—*Anacardiaceae*. Warm greenhouse trees. Cultivated for the edible fruits. First introduced early eighteenth century.

CULTURE: Compost, fibrous loam and sand. Position, well-drained borders in heated greenhouse or conservatory. Water freely during growing season, moderately at other times. Temp., March to Sept. 65° to 75°, Sept. to March 50° to 55°.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy soil under bell-glass in temp. 75°.

SPECIES CULTIVATED: *S. cytherea* (syn. *S. dulcis*), 'Otaheite Apple', fruits 3 in. long, golden yellow, to 60 ft., Society Islands; *Mombin* (syn. *S. lutea*), fruits 1 to 2 in. long, yellow, to 60 ft., Tropics.

Spotted Laurel, see *Aucuba*.

Spraguea—*Portulacaceae*. Hardy perennial herb. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, edges of sunny well-drained borders or rockeries. Plant, April or May.

PROPAGATION: By seeds sown, Feb. or March, in well-drained pots or pans, transplanting seedlings an inch apart in 3 in. pots when large enough to handle and planting out in May; cuttings of shoots inserted in sandy peat under bell-glass in spring.

SPECIES CULTIVATED: *S. multiceps*, 'Pussy Paws', pink, summer, 2 in., N. America; *umbellata*, white, summer, 2 in., California.

Sprekelia—*Amaryllidaceae*. Warm house bulbous plants. First introduced mid-seventeenth century.

CULTURE: Compost, two parts turfy loam, one part river sand and a few crushed bones. Position, well-drained pots in light part of stove. Pot, Feb., burying bulb about two-thirds of its depth. Water freely from time growth begins (about Feb.) until Sept., when keep quite dry. Apply liquid manure when flower spike shows. Top-dress large bulbs annually and repot every three or four years only. Temp., Feb. to Sept. 65° to 75°, Sept. to Feb. 50° to 55°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of sandy loam in temp. 65° to 70° in March, placing seedlings singly in 2 in. pots, and keeping them moderately moist all the year round for three years; by offsets, treated as old bulbs. Seedlings are six to seven years before they flower.

SPECIES CULTIVATED: *S. formosissima* (syn. *Amaryllis formosissima*), 'Jacobean Lily', crimson, June, 2 ft., Mexico and Guatemala.

Spring Beauty, see *Claytonia*; **-Starflower**, see *Ipheion uniflora* under *Brodiaea*

Spruce, see *Picea*.

Spurge, see *Euphorbia*; **-Laurel**, see *Daphne Laureola*.

Squash, see *Cucurbita maxima*.

Squirrel-foot Fern, see *Davallia bullata*; **-tail Grass**, see *Hordeum jubatum*.

Stachys (Woundwort; Betony)—*Labiatae*. Hardy and half-hardy perennials and one tuberous-rooted vegetable. First introduced late eighteenth century.

CULTURE OF CHINESE ARTICHOKE: Soil, ordinary, deeply dug. Position, sunny.

Plant tubers 9 in. apart, 4 in. to 6 in. deep in rows 18 in. asunder in March or April. Stir surface of soil between rows frequently. No earthing up required. Lift tubers in autumn as required for use. Cover surface of ground in severe weather.

CULTURE OF HARDY PERENNIALS: Soil, ordinary. Position, warm, sheltered border for *S. coccinea*; edgings to borders or beds for *S. lanata*; well-drained sunny rock gardens for *S. corsica* and *S. lavandulaefolia*. Plant, autumn or spring.

PROPAGATION: By division in autumn or spring.

SPECIES CULTIVATED: *S. coccinea*, scarlet, summer, 2 ft., Mexico; *corsica*, cream and pink, summer, 1 in., Corsica and Sardinia; *grandiflora* (syn. *S. Betonica*), violet, May to July, 1 ft., Asia Minor, and var. *robusta*, rosy pink; *lanata*, 'Lamb's Ear', leaves white and woolly, 1 ft., Caucasus; *lavandulaefolia*, purplish-rose, July to Aug., 6 in., Caucasus and Asia Minor; *officinalis* (syns. *S. Betonica*, *Betonica officinalis*), purple, to 3 ft., Europe, Asia Minor; *Sieboldii* (syn. *S. tuberifera*), 'Chinese Artichoke', pink, summer, 1 ft., roots white, spiral in shape and edible, Japan.

Stachyurus—*Stachyuraceae*. Hardy deciduous flowering shrubs, attractive warm coloured stems and sulphur-yellow blooms in Feb. First introduced mid-nineteenth century.

CULTURE: Soil, peat, leaf-mould and loam. Position, sheltered shrubberies. Plant, Nov. to Feb.

PROPAGATION: By cuttings with a heel removed in July and inserted in sandy soil under bell-glass in gentle bottom heat.

SPECIES CULTIVATED: *S. chinensis*, pale yellow, Feb. to March, 6 to 12 ft., China; *praecox*, pale yellow, Feb., 5 to 10 ft., Japan.

Staghorn Fern, see *Platycerium bifurcatum*; **-Sumach**, see *Rhus typhina*.

Stanhopea—*Orchidaceae*. Epiphytes, with clustered pseudo-bulbs, rather small, carrying a single leaf. Scapes from the bulb base, usually pendent. Flowers large, attractive, though lasting but a few days, among the most remarkable in the orchid family. Sepals and petals thin, lip wax-like. Variation is present but in the more popular kinds the base of the lip is cup-like (the hypochil), from this proceeds a fleshy, grooved extension (the mesochil) bearing two large curved horns, and terminating in a usually heart-shaped lobe (the epichil). Species are known which are hornless and in some the lip is so contorted that it is difficult to trace the three divisions.

CULTURE: Compost, two to three parts osmunda fibre, one part, or more, sphagnum moss. Teakwood baskets which can be suspended are preferable, drainage so placed as to allow exit for the spikes. While growing a moist atmosphere is needed and liberal watering, with shading, and as far as possible a tropical temp. In winter 60° to 65° is sufficient and a fairly moist atmosphere, water then being very infrequently needed. Remove shading early in autumn.

PROPAGATION: Division of large plants is the better method but two or three healthy back bulbs may be removed in spring, placed on small crocks in a pot, surfaced with sphagnum and put into a propagating case; gentle bottom heat is an aid to growth. Pot when roots are seen but return to case for a week or two.

SPECIES CULTIVATED: A selection—*S. Bucephalus*, variable, large, fragrant, yellow to orange-yellow, spotted purplish-crimson, lip usually yellow, late summer, Ecuador, Peru, Mexico, var. *guttata*, apricot, petals and hypochil blotched brown; *costaricensis*, large, yellow, with large purplish spots, hypochil purple-brown at base, variable, autumn, Costa Rica; *Devoniensis*, fragrant, creamy or fawn-yellow, marked brown-crimson, lip white, spotted purple, with three small teeth, summer, Mexico; *eburnea*, large, fragrant, white, hypochil with two short horns, mesochil hornless, summer, Trinidad, Guiana; *ecornula*, white, yellow, lip hornless, not showing divisions, summer, Guatemala; *graveolens*, pale yellow, hypochil apricot-yellow, mesochil and horns ivory-white, epichil sometimes purple spotted, summer, Brazil; *insignis*, large, fragrant, variable, yellow, purple spotted, hypochil whitish, purple spotted, epichil similarly coloured, summer, Brazil, Peru;

Lowii, large, fragrant, cream or cream buff, lip ivory-white, hypochil suffused with maroon, hornless, winter, Colombia; *Madouxiana*, large, fragrant, creamy white, spotted rose, summer, Colombia; *Martiana*, large, whitish, petals spotted crimson-purple, epichil dimly three-toothed, summer, autumn, Mexico; *oculata*, large, fragrant, variable, yellow, with ocellated red spots, summer, Brazil, Guatemala, Mexico; *platyceras*, yellow, spotted red-purple, horns broad, sickle shape, summer, Colombia; *tigrina*, largest, showiest, very fragrant, deep crimson-red and yellow, hypochil orange-yellow, blotched maroon-purple, mesochil whitish, horns white, purple spotted, epichil often purple spotted, three-toothed in front, variable, summer, Brazil, Mexico, Guiana, Venezuela (the correct name but not in use is *Stanhopea Hernandezii*); *Wardii*, large, fragrant, yellow, spotted red-purple, hypochil orange, blotched maroon, horns sickle shape, summer, Guatemala, Venezuela, vars. *aurea*, deep orange-yellow, hypochil with two blotches, *amoena*, lemon-yellow, purple dotted, hypochil with two maroon blotches.

Stanleya—*Cruciferae*. Hardy perennial herb. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny border. Plant, Oct. or April.

PROPAGATION: By seeds sown in gentle heat in spring, planting out in May or June; also by division of the roots in Oct. or March.

SPECIES CULTIVATED: *S. pinnata*, yellow, summer, 4 ft., California.

Stapelia (Carrion Flower)—*Asclepiadaceae*. Greenhouse evergreen succulent-stemmed plants. Flowers disagreeably scented. First introduced late eighteenth century.

CULTURE: Compost, two parts sandy loam, one part broken rubbish or old mortar, and one part sand. Position, well-drained pots close to glass in light, sunny greenhouse or planted in prepared border between rocks. No shade required. Pot, March or April. Water moderately April to Oct., keep nearly dry remainder of year. Temp., Oct. to March 40° to 50°, March to Oct. 55° to 75°. Repot or plant only when absolutely necessary.

PROPAGATION: By cuttings of stems exposed to air on shelf in greenhouse for two or three days, then inserted singly in 2 in. pots half-filled with drainage, remainder with sand and brick rubbish; spring.

SPECIES CULTIVATED: *S. Asterias*, 'Star-fish Flower', violet, yellow, and purple, summer, 6 in., S. Africa; *deflexa*, green and red, summer, 4 to 6 in., S. Africa; *geminiflora*, dark brown, spotted yellow, Oct., 6 in., S. Africa; *gigantea*, yellow, red, brown, and purple, summer, 6 in., S. Africa; *grandiflora*, purple, autumn, 1 ft., S. Africa; *maculosa*, yellowish and red, July to Sept., 1 ft., S. Africa; *mutabilis*, greenish-yellow, purple and red, June and July, 6 in., S. Africa; *rufa*, violet-purple with red, June to Oct., 6 in., S. Africa; *variegata*, greenish-yellow and purplish-brown, Aug., 4 to 6 in., S. Africa, and var. *clypeta* (syn. *S. Bufonis*), 'Toad Flower', spotted and lined purple-brown.

Staphylea—*Staphyleaceae*. Hardy deciduous shrubs with ornamental flowers and foliage and curious inflated fruits. First introduced early seventeenth century.

CULTURE: Soil, moist, loamy. Position, sunny borders or shrubberies. Plant, Oct. to Feb. Prune straggling shoots moderately closely immediately after flowering.

CULTURE OF *S. COLCHICA* FOR FORCING: Compost, two parts sandy loam, one part leaf-mould. Pot, Oct. to Jan. Place in sheltered position outdoors, or in cold frame until Jan., then remove into forcing house, or end of Jan. into cold greenhouse. Temp., 65° to 75°. Water moderately when first placed in heat, afterwards more freely. Syringe daily until leaves expand. Transfer to cold frame after flowering. Harden and stand outdoors, May to Oct.

PROPAGATION: By seeds sown in sandy soil in sheltered position outdoors in Sept. or Oct.; cuttings of firm shoots, 6 to 8 in. long, inserted in sandy soil in cold frame or in sheltered corner outdoors in Sept.; layering shoots, Sept. or Oct.; suckers removed and planted, Oct. to Feb.

SPECIES CULTIVATED: *S. Bumalda*, greenish-white, autumn-tinted foliage, May to June, 2 to 3 ft., Japan and Cent. China; *colchica*, white, pleasantly fragrant

conspicuous bladder fruits, May, 6 to 10 ft., Caucasus; *holocarpa*, white, May, 20 to 30 ft., Cent. China, with its more attractive var. *rosea*, pale pink, slightly larger flowers; *pinnata*, 'Bladder Nut', white, May, 10 to 15 ft., Europe and Asia Minor; *trifolia*, dull white, least attractive species, May, 8 to 12 ft., Eastern U.S.A.

Star Anise, see *Illicium verum*; **-Apple**, see *Chrysophyllum Cainito*; **-fish Flower**, see *Stapelia Asterias*; **-flower**, see *Trientalis europaea*; **-fruit**, see *Damasonium*; **-Grass**, see *Hypoxis*; **-Jasmine**, see *Trachelospermum jasminoides*; **-of-Bethlehem**, see *Ornithogalum umbellatum*; **-Tulip**, see *Calochortus*; **-wort**, see *Aster*.

State Flower of Colorado, see *Aquilegia caerulea*.

Statice, see *Limonium*.

Stauntonia—*Berberidaceae* (or *Lardizabalaceae*). Slightly tender evergreen climbing shrubs with unisexual flowers; purple fruits, resembling walnuts, eaten by Japanese. First introduced mid-nineteenth century.

CULTURE: Soil, deep, sandy loam. Position, south wall or trellis in southern counties; trained up trellis in conservatories or unheated greenhouses. Plant, Sept., Oct., March or April. Prune trailing shoots not required to produce flowers following season to two-thirds of their length in autumn.

PROPAGATION: By cuttings of firm young shoots inserted in sandy soil under bell-glass in shady position outdoors in summer.

SPECIES CULTIVATED: *S. hexaphylla*, white, tinged violet, April, 10 to 20 ft., China and Japan. See also the genus *Holboellia*.

Stelis—*Orchidaceae*. A large epiphytic genus allied to *Pleurothallis* which it resembles in habit. Flowers small. In one section the flowers open and close at different times in the day.

CULTURE: Compost and conditions as for *Pleurothallis*.

PROPAGATION: By division of plants when repotting in spring.

SPECIES CULTIVATED: A selection—*S. barbata*, greenish, red-purple, sepals haired, various, Costa Rica; *ciliaris* (syn. *S. atropurpurea*), deep purple, whitish, sepals fringed, spring, Mexico; *grandiflora*, comparatively large, chocolate-brown, summer, Brazil; *Miersii*, very many, very small, greenish-white, summer, Brazil; *muscifera*, dark purple, summer; *ophioglossoides*, many, small, greenish-purple, arranged one-sidedly, autumn, Brazil, W. Indies.

Stellaria—*Caryophyllaceae*. Hardy perennial with golden foliage; used for carpet bedding.

CULTURE: Soil, ordinary. Position, as edgings to or bands in summer beds. Plant in May.

PROPAGATION: By division in autumn.

SPECIES CULTIVATED: *S. graminea aurea*, pale yellow, 3 in. U.S.A.

Stenandrium—*Acanthaceae*. Stove flowering perennial, grown as a foliage plant in the greenhouse. First introduced late nineteenth century.

CULTURE: Compost, equal parts peat, leaf-mould, loam and sand. Position, well-drained pots in light stove Sept. to June, sunny frame June to Sept. Pot, March or April. Water moderately in winter, freely other times. Temp., Sept. to March 55° to 65°, March to June 65° to 75°. Prune shoots to within 1 in. of base after flowering. Apply liquid manure occasionally to plants in flower.

PROPAGATION: By cuttings of young shoots inserted in sandy peat under bell-glass in temp. 75°, March to July.

SPECIES CULTIVATED: *S. Lindenii*, yellow, leaves dark green above veined with white or yellow-purple beneath, 6 to 12 in., Peru. See also *Eranthemum*.

Stenanthium—*Liliaceae*. Hardy perennials. First introduced mid-nineteenth century.

CULTURE: Soil, sandy loam and peat. Position, well-drained, partially shaded beds or borders. Plant, Oct. or March and April.

PROPAGATION: By seeds sown in pans in cool greenhouse or frame during March or April; offsets, detached at planting time.

SPECIES CULTIVATED: *S. gramineum* (syn. *S. angustifolium*), greenish-yellow, June to July, 2 to 3 ft., N. America; *occidentale*, purple, summer, N.W. America; *robustum*, white, summer, 4 to 5 ft., N. America.

Stenocactus—*Cactaceae*. Greenhouse succulent plants, sometimes included in *Echinocactus*.

CULTURE: As *Echinocactus*.

PROPAGATION: As *Echinocactus*.

SPECIES CULTIVATED: *S. coptonogonus*, white and purple, May, 4 in., Mexico; *crispatus*, purple, summer, 8 in., Mexico; *heteracanthus*, greenish-yellow, Mexico; *Lloydii*, pale rose-pink, small, Mexico; *Ochoterenaus*, white to pale rose, Mexico; *Vaupelianus*, pale yellow, Mexico.

Stenoglottis—*Orchidaceae*. A terrestrial genus allied to *Orchis*. Only three species are known. Roots fascicled, tuberous. Leaves in rosette formation, deciduous. Spike from centre. Flowers rather small, numerous, pleasing.

CULTURE: Compost, chiefly fibrous loam with sand and a little leaf-mould and sphagnum moss. Water freely when in full growth, only occasionally, if at all, when dormant. Winter temp. 50°, can then be placed on a shelf. Summer temp. 60° to 70° or more, with shading.

PROPAGATION: Several crowns are often formed and can be separated and potted in early spring, as soon as growth is seen.

SPECIES CULTIVATED: *S. fimbriata*, ten to thirty, rosy or purplish-red, lip darker spotted, leaves brown spotted, autumn, S. Africa; *longifolia*, twenty-five to a hundred, rosy-mauve, spotted rose-purple, leaves green or brown spotted, height up to 2 ft., autumn, Natal, and vars. *alba*, white, *splendens*, stronger, rose-purple.

Stenotaphrum—*Gramineae*. Greenhouse ornamental-leaved grass. Leaves, narrow, grass-like, striped with yellow. First introduced late nineteenth century.

CULTURE: Compost, equal parts peat, loam, leaf-mould and sand or jadoo fibre. Position, warm and moist part of greenhouse. Pot, March. Water copiously March to Sept., fairly freely Sept. to March. Temp., Sept. to March 50° to 55°, March to Sept. 55° to 65°.

PROPAGATION: By cuttings of shoots or by division of roots in spring.

SPECIES CULTIVATED: *S. secundatum*, 'St. Augustine's Grass', 1 ft., Carolina, var. *variegatum*, 'Variegated Grass'.

Stephanandra—*Rosaceae*. Hardy deciduous ornamental-leaved shrubs, stems attractive, sepia-tinted in winter. First introduced late nineteenth century.

CULTURE: Soil, moist loam. Position, in groups on the lawn, in the wild garden, or in the shrubbery. Plant in autumn.

PROPAGATION: By suckers or divisions; also by cuttings in summer under bell-glass.

SPECIES CULTIVATED: *S. incisa* (syn. *S. flexuosa*), greenish-white, June, fern-like foliage, 4 to 8 ft., Japan and Korea; *Tanakae*, yellowish-white, June to July, foliage turns orange in autumn, 4 to 6 ft., Japan.

Stephanotis—*Asclepiadaceae*. Stove evergreen twining shrubs. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts good, light, fibrous loam and peat and one part equal proportions leaf-mould, well-decayed manure and coarse silver sand. Position, pots, tubs or beds, well drained, with shoots trained to wire trellis or up rafters of stove. Pot or plant, Feb. or March. Shade from sun. Water copiously March to Oct., moderately afterwards. Syringe daily March to Oct., except when in bloom. Apply stimulants once a week to healthy established plants between May and Sept. Prune straggling shoots moderately closely and thin out weak shoots freely, Jan. or Feb. Temp., March to Oct. 70° to 85°, Oct to March 55° to 65°.

PROPAGATION: By cuttings of the shoots of the previous year's growth inserted

singly in 2 in. pots, filled with equal parts sand, peat and loam, placed under bell-glass in temp. 65° to 75° in spring.

SPECIES CULTIVATED: *S. floribunda*, 'Clustered Wax-flower', 'Madagascar Jasmine', white, fragrant, spring and summer, 10 to 15 ft., Madagascar, and var. *Elvastonii*, a dwarfed and more free-flowering form.

Sternbergia—*Amaryllidaceae*. Hardy bulbous plants. Leaves produced usually late in autumn or early in spring after flowering. First introduced late sixteenth century.

CULTURE: Soil, deep, fairly dry, good ordinary. Position, sunny sheltered border. Plant bulbs, Oct. or Nov., 4 to 6 in. deep and 2 or 3 in. apart. Lift and replant when bulbs show signs of deterioration. May also be grown in pots in cold greenhouse as advised for *Amaryllis Belladonna*.

PROPAGATION: By offsets, removed and planted Oct. or Nov.

SPECIES CULTIVATED: *S. colchiciflora*, produces its leaves in spring and its pale yellow flowers in autumn, Hungary; *Fischeriana*, 6 in. crocus-like flowers in April, Medit. Region; *lutea*, 'Winter Daffodil', 'Yellow Star Flower', yellow, autumn, Asia Minor, and var. *major*, flowers much larger than type; *macrantha*, yellow, autumn, S. Europe.

Stevensonia—*Palmae*. Stove palm with once-divided, wedge-shaped, green leaves. First introduced mid-nineteenth century.

CULTURE: Compost, two parts fibrous peat, one part equal proportions charcoal, turfy loam and sand. Position, moist, shady part of stove. Pot, Feb. or March. Syringe freely twice daily Feb. to Oct., once daily afterwards. Water freely at all times. Shade and moist atmosphere essential. Temp., March to Oct. 70° to 85°, Oct. to March 65° to 75°.

PROPAGATION: By seeds sown 1 in. deep in peat and loam in small pots in temp. 75° to 85°, spring.

SPECIES CULTIVATED: *S. Borsigiana* (syn. *S. grandiflora*), 20 to 40 ft., Seychelles.

Stevia—*Compositae*. Slightly tender herbaceous perennials. First introduced early nineteenth century.

CULTURE: Soil, sandy loam. Position, well-drained sheltered borders. Protect with litter during the winter. Plant, Oct. or March and April.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *S. waefolia*, deep rose, summer, 1½ to 2 ft., Mexico; *ovata*, white, Aug., 2 ft., Mexico. The plant commonly listed as *S. serrata* is *Piqueria trinervia*.

Stewartia—*Theaceae* (or *Ternstroemiaceae*). Hardy deciduous flowering shrubs, allied to *Camellia*, with great beauty of flower in July and Aug., and attractive autumn foliage. Neglected in gardens. First introduced late eighteenth century.

CULTURE: Soil, ordinary loam, well drained but moist, and containing a generous addition of peat and leaf-mould or compost. Dry situations not suitable. Position, open sunny borders sheltered on north and east by walls, trees or shrubs. Plant, Oct. to Feb.

PROPAGATION: By cuttings of firm shoots inserted in sandy soil under hand-light in sheltered position outdoors in autumn; layering shoots in Sept. or Oct.; seeds sown ½ in. deep in sandy peat in temp. 75° as soon as ripe.

SPECIES CULTIVATED: *S. koreana*, white, hardy, July and Aug., 15 to 25 ft., Korea; *Malacodendron*, white, purple stamens, July and Aug., 12 to 20 ft., S.E. United States; *monadelphica*, ivory white, purple centred, July, 15 to 30 ft., Japan; *ovata* (syn. *S. pentagyna*), white, orange anthers, July, 10 to 15 ft., S.E. United States, with var. *grandiflora*, flowers larger, up to 4 in. across; *Pseudo-Camellia*, white, cup-shaped, requiring some shelter, July, 20 to 30 ft., Japan; *serrata*, white, flushed red on outside, July and Aug., 20 to 30 ft., Japan; *sinensis*, white, fragrant, decorative peeling bark, July, 20 to 30 ft., Cent. China.

Stiffia—*Compositae*. Stove evergreen shrub. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part leaf-mould and sand. Position, light airy situation in stove or warm greenhouse. Water freely March to Sept., moderately afterwards. Syringe twice daily March to Aug. Feed with liquid manure when established in final pots or when planted out in beds. Temp., March to Sept. 75° to 80°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings of the young growth inserted in sandy soil under bell-glass or in propagating frame, with bottom heat.

SPECIES CULTIVATED: *S. chrysantha*, orange-yellow, Feb. to April, 6 ft., Brazil.

Stigmaphyllon—*Malpighiaceae*. Stove evergreen climbing shrubs. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam, leaf-mould, peat and sand. Position, well-drained pots, with shoots trained up roofs or round trellis. Pot, Feb. or March. Prune away weak growths and shorten strong ones moderately, Jan. Water freely March to Sept., moderately afterwards. Syringe daily in summer. Temp., March to Sept. 70° to 85°, Sept. to March 55° to 65°.

PROPAGATION: By cuttings of firm shoots inserted singly in small pots of sandy soil under bell-glass in temp. 65° to 75°, spring or summer.

SPECIES CULTIVATED: *S. ciliatum*, 'Golden Vine', yellow, June to Sept., 8 to 10 ft., Brazil; *littorale*, yellow, autumn, 15 to 20 ft., Brazil.

Stinking Cedar, see *Torreya taxifolia*; **-Gladwyn**, see *Iris foetidissima*; **-Hellebore**, see *Helleborus foetidus*.

Stipa (Feather Grass)—*Gramineae*. Hardy perennial flowering grasses. Inflorescence borne in feathery panicles. *S. tenacissima* is grown for fibre for paper making.

CULTURE: Soil, ordinary. Position, dryish sunny borders for *S. pennata* and *S. tenacissima*; pots in unheated greenhouse for *S. elegantissima*. Plant or pot, March or April. Gather inflorescence for drying for winter decoration in July.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in shallow boxes or pots filled with light soil placed in temp. of 55° to 65°, Feb. or March, hardening off seedlings and planting outdoors, May or June; or by sowing similar depth in ordinary soil in sunny position outdoors in April; also by division of roots in March or April.

SPECIES CULTIVATED: *S. elegantissima*, 3 ft., Australia; *pennata*, 2 ft., Europe; *tenacissima*, 'Esparto Grass', 3 ft., Spain and N. Africa.

Stock, see *Mathiola*; **-Gilliflower**, see *Mathiola incana*; **Virginia-**, see *Malcomia maritima*.

Stokesia (Stokes's Aster)—*Compositae*. Hardy perennial herb. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, sunny well-drained borders. Plant, April. Protect in winter by covering with hand-light in cold districts. Plants may be lifted in Sept., placed in pots, and removed to greenhouse for flowering during autumn and winter, afterwards planting outdoors following April.

PROPAGATION: By division of roots, March or April.

SPECIES CULTIVATED: *S. laevis* (syn. *S. cyanea*), blue, Aug., 18 in., N. America, and vars. *alba*, *caerulea*, *elegans*, *lutea* and *rosea*.

Stonecrop, see *Sedum*; **-wort**, see *Chara*.

Stone-face, see *Lithops*.

Storax, see *Styrax*.

Stranvaesia—*Rosaceae*. Hardy evergreen trees and shrubs with handsome foliage, white flowers, and hawthorn-like berries. First introduced early nineteenth century.

CULTURE: Soil, sandy loam. Position, partial shade or full exposure, useful for chalk soils and exposed and maritime localities.

PROPAGATION: By cuttings of half-ripened shoots in sandy soil under bell-glass in gentle bottom heat.

SPECIES CULTIVATED: *S. Davidiana*, white, June, 20 to 30 ft., scarlet berries, W. China, with var. *undulata*, 8 to 12 ft., spreading, coral berries; *salicifolia*, white, June, red fruits, 20 to 30 ft., upright habit, useful evergreen, W. China.

Stratiotes (Water Soldier)—*Hydrocharitaceae*. Hardy aquatic perennial.

CULTURE: Soil, ordinary. Position, shallow lakes or ponds. Plant, March to July, by just dropping plants into the water. They lie beneath the surface, coming to the top to flower about July.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *S. aloides*, white, July, 1 to 2 ft., Britain.

Strawberry, see *Fragaria*; **-Tree**, see *Arbutus Unedo*.

Strawflower, see *Helichrysum bracteatum*.

Strelitzia—*Musaceae*. Greenhouse flowering perennials. First introduced mid-eighteenth century.

CULTURE: Compost, two parts loam, one part peat and half a part silver sand. Position, pots or bed in sunny part of warm greenhouse. Pot or plant, Feb. or March. Water copiously April to Sept., moderately Sept. to Nov., keep nearly dry afterwards. No shade required. Temp., March to Oct. 65° to 75°, Oct. to March 55° to 65°.

PROPAGATION: By seeds sown in compost of leaf-mould, peat and loam in temp. of 65° to 75°, spring; offsets or division of old plants, Feb. or March.

SPECIES CULTIVATED: *S. augusta*, white and purple, spring, to 18 ft., S. Africa; *Nicolai*, white and blue, May, to 25 ft., S. Africa; *Reginae*, 'Bird of Paradise Flower', orange and blue, spring, 3 to 4 ft., S. Africa, var. *citrina*, yellow and blue.

Streptocarpus (Cape Primrose)—*Gesneriaceae*. Greenhouse herbaceous perennials. First introduced early nineteenth century.

CULTURE: Compost, two parts loam, one part of equal proportions leaf-mould, decayed manure and silver sand. Position, pots in light greenhouse. Pot, March or April. Temp., 40° to 50° Oct. to April, 55° to 65° April to Oct. Shade from sun. Water freely April to Oct., keep nearly dry afterwards. Apply weak stimulants when plants are in flower. Admit air freely in summer. Shady cold frame good position for young plants during summer.

PROPAGATION: By seeds sown in well-drained pots, pans or boxes with equal parts of finely sifted loam, leaf-mould, peat and sand. Cover the seeds thinly with a sprinkle of fine silver sand. Moisten the soil by holding the pot, pan or box nearly to its rim or edge in tepid water. Place a pane of glass over top of pot, pan or box and put in a temp. 55° to 65°. Transplant seedlings as soon as large enough to handle 1 in. apart in above compost, in pans or pots, and when seedlings touch each other place them singly in 3 in. pots, and ultimately into 5 or 6 in. pots. Seeds sown in Feb. will produce plants for flowering following July; in March or April, following Aug. or Sept.

SPECIES CULTIVATED: *S. caulescens*, pale lilac, summer, 12 in., Trop. Africa; *Dunnii*, rose, summer, 12 to 18 in., S. Africa; *Galpinii*, rosy-violet, Oct., 9 in., Transvaal; *grandis*, blue and white, 1½ to 2 ft., summer, S. Africa; *Holstii*, purple, mauve and white, summer, 18 in., Trop. E. Africa; *kewensis*, rosy purple, summer, 9 in., hybrid; *orientalis*, purple, summer, 12 in., Siam; *polyantha*, lavender, winter, 12 in., S. Africa; *Rexii*, blue, summer, 6 to 12 in., S. Africa; *Sandersii*, pale blue, Sept., 1 to 1½ ft., S. Africa; *Wendlandii*, blue, spring, 1½ to 2½ ft., S. Africa. Practically all the vars. cultivated to-day are hybrids between these species.

Streptosolen—*Solanaceae*. Greenhouse evergreen flowering shrub. First introduced early nineteenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould and half a part silver sand. Position, well-drained pots close to glass in light, sunny greenhouse. Pot, Feb. to April. Prune shoots moderately closely after flowering. Water freely April to Oct., moderately afterwards. Apply weak stimulants occasionally during

summer. Shade only from bright sunshine. Temp., March to Oct. 60° to 70°; Oct. to March 50° to 60°.

PROPAGATION: By cuttings inserted in light, sandy soil under bell-glass in temp. 55° to 65°, spring or summer.

SPECIES CULTIVATED: *S. Jamesonii* (syn. *Browallia Jamesonii*), orange, summer, 4 to 6 ft., Colombia.

Striped Squill, see *Puschkinia scilloides*.

Strobilanthes (Cone-head)—*Acanthaceae*. Stove evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam and leaf-mould with a little silver sand. Pot, March or April. Position, well-drained pots in moist, light part of heated greenhouse. Temp., March to Sept. 75° to 85°, Sept. to March 60° to 65°. Prune shoots closely, Feb. Water moderately Sept. to April, freely other times. Use syringe frequently during the growing season. Apply liquid manure twice a week to plants in flower.

PROPAGATION: By cuttings of moderately firm shoots, 2 to 3 in. long, inserted in light, sandy compost under bell-glass in temp. 80°, Feb. to April.

SPECIES CULTIVATED: *S. anisophyllus* (syn. *Goldfussia anisophylla*), lavender blue, Oct. to March, 1 to 3 ft., Himalaya; *Dyerianus*, violet and blue, autumn, 3 ft., Burma; *glomeratus*, purple, autumn, 2 to 4 ft., Himalaya, Burma; *isophyllus* (syn. *Goldfussia isophylla*), blue and white, winter, 2 to 3 ft., India. See also *Ruellia*.

Stropholirion, see *Brodiaea*.

Stuartia, see *Stewartia*.

Studflower, see *Helonias*.

Stylidium—*Stylidiaceae*. Evergreen perennial plants.

CULTURE: Loam, leaf-mould and sand in equal proportions and some sharp grit. Inclined to be spring tender and best grown in alpine house or cold frame.

PROPAGATION: By seeds sown in spring in compost as above.

SPECIES CULTIVATED: *S. caespitosum*, pink and white, June, 12 in., Australasia; *graminifolium*, pink, June to July, 12 in., Australasia.

Stylophorum—*Papaveraceae*. Hardy perennial herb. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary moist. Position, partially shaded beds or borders. Plant, March or April.

PROPAGATION: By seeds sown $\frac{1}{4}$ in. deep in ordinary soil in sunny position outdoors, March or April; division of roots, March.

SPECIES CULTIVATED: *S. diphyllum*, 'Celandine Poppy', yellow, June, 12 to 18 in., N.W. America.

Styrax (Storax, Snowbell)—*Styracaceae*. Hardy and slightly tender deciduous flowering shrubs, flowers generally pendent, resembling snowdrops. First introduced late sixteenth century.

CULTURE: Soil, light peaty. Position, sheltered sunny borders or shrubberies, or against south walls. Plant, Oct. to Feb.

PROPAGATION: By seeds sown in peaty soil in gentle heat in March; cuttings of half-ripened wood in gentle heat in July; layers in spring or autumn.

SPECIES CULTIVATED: *S. americana*, white, June to July, 3 to 8 ft., S.E. United States; *dasyantha*, white, July, 15 to 25 ft., requiring protection, Cent. China; *Hemslyana*, white, June, 15 to 25 ft., Cent. and W. China; *japonica*, white, fragrant, hardy, 12 to 25 ft., Japan and Korea; *Obassia*, white, fragrant, in clusters, June, requiring shelter and some shade, 20 to 30 ft., Japan; *officinalis*, white, June, fragrant, in clusters, for warmer localities only, 10 to 12 ft., Greece and Asia Minor; *Wilsonii*, white, June, dense growth, flowering when very small, 4 to 8 ft., W. China.

Succisella—*Dipsacaceae*. Hardy herbaceous perennial, closely related to *Scabiosa*.

CULTURE: Soil, ordinary. Position, sunny.

PROPAGATION: By seed; division.

SPECIES CULTIVATED: *S. inflexa* (syns. *Scabiosa inflexa*, *S. australis*), pale lilac, summer, 1 to 3 ft., Cent. Europe; *Petteri* (syn. *Scabiosa Petteri*), pale lilac, summer, 1 to 3 ft., Dalmatia.

Sugar Cane, see *Saccharum officinarum*; -**Maple**, see *Acer saccharum*.

Sumach, see *Rhus*.

Summer Cypress, see *Kochia scoparia*; -**Savory**, see *Calamintha hortensis*;

-**Snowflake**, see *Leucojum aestivum*.

Sundew, see *Drosera*.

Sun Drops, see *Oenothera fruticosa*; -**flower**, see *Helianthus*; -**plant**, see *Portulaca grandiflora*; -**rose**, see *Helianthemum*.

Supple Jack, see *Berchemia scandens*.

Swainsona (Darling River Pea)—*Leguminosae*. Greenhouse evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, two parts fibrous loam, one part peat and half a part silver sand. Position, well-drained pots in light, sunny greenhouse. Pot, Feb. or March. Water freely March to Oct., moderately afterwards. Apply weak stimulants occasionally in summer. Remove to cold frame or pit, June; replace in greenhouse, Sept. Temp., Sept. to March 35° to 45°, March to June 55° to 65°.

PROPAGATION: By seeds soaked for about an hour in tepid water, then sown $\frac{1}{2}$ in. deep in light soil in temp. 55° to 65°, March or April; cuttings of young shoots, 2 to 3 in. long, inserted in silver sand under bell-glass in cool, shady part of greenhouse in summer.

SPECIES CULTIVATED: *S. galegifolia*, purplish-red, summer, 3 to 4 ft., Australia, var. *coronillaefolia*, violet.

Swan River Daisy, see *Brachycome iberidifolia*; -**Orchid**, see *Cynoches*; -**River Everlasting**, see *Helipterum Manglesii*.

Swamp Bay, see *Magnolia glauca*; -**Cypress**, see *Taxodium distichum*; -**Honeysuckle**, see *Rhododendron viscosum*; -**Pink**, see *Helonias bullata*.

Swede, see *Brassica Napobrassica*.

Sweet Alyssum, see *Lobularia maritima*; -**Bay**, see *Laurus*; -**brier**, see *Rosa Eglanteria*; -**Corn**, see *Zea Mays* var. *rugosa*; -**Cicely**, see *Myrrhis odorata*; -**Fern**, see *Comptonia peregrina*; -**Flag**, see *Acorus Calamus*; -**Gale**, see *Myrica Gale*; -**Gum Tree**, see *Liquidambar Styraciflua*; -**Maudlin**, see *Achillea Ageratum*; -**Pea**, see *Lathyrus odoratus*; -**Pepper Bush**, see *Clethra alnifolia*; -**Potato**, see *Ipomoea Batatas*; -**Scabious**, see *Scabiosa atropurpurea*; -**sop**, see *Annona squamosa*; -**Sultan**, see *Centaurea moschata*; -**Vernal Grass**, see *Anthroxanthum odoratum*; -**William**, see *Dianthus barbatus*.

Swertia (Marsh Fel-wort)—*Gentianaceae*. Hardy perennial herb.

CULTURE: Soil, equal parts peat and leaf-mould. Position, moist rockeries or damp places. Plant, March to April. Water copiously in dry weather.

PROPAGATION: By seeds sown in well-drained pans filled with moist peat, placed in shady, cold frame, March or April, transplanting seedlings outdoors in June; division of roots in March.

SPECIES CULTIVATED: *S. perennis*, blue, greyish-purple and black, 1 ft., N. Europe.

Swietenia (Mahogany)—*Meliaceae*. Stove evergreen tree with dark red wood which furnishes the mahogany of commerce; of economic interest only. First introduced early eighteenth century.

CULTURE: Soil, sandy loam. Position, well-drained borders in heated green-

house. Temp., March to Sept. 70° to 80°, Sept. to March 55° to 60°. Water freely during growing season, moderately at other times. Plant, April.

PROPAGATION: By cuttings of ripened shoots under bell-glass in temp. 75°.

SPECIES CULTIVATED: *S. Mahagoni*, to 75 ft., W. Indies and S. Florida.

Switch Grass, see *Panicum virgatum*.

Sword Lily, see *Gladiolus*.

Sycamore, see *Acer Pseudo-Platanus*.

Sycopsis—*Hamamelidaceae*. Hardy evergreen small winter-flowering tree, related to Wych-Hazel. First introduced early twentieth century.

CULTURE: Soil, ordinary. Position, shrubberies, or as isolated specimens.

PROPAGATION: By cuttings of half-ripened wood placed in gentle bottom heat, July.

SPECIES CULTIVATED: *S. sinensis*, red bracts, yellow stamens, Feb., 15 to 25 ft. Cent. and W. China.

Sydney Golden Wattle, see *Acacia longifolia*.

Symphoricarpos—*Caprifoliaceae*. Hardy deciduous flowering and berry-bearing shrubs. Flowers much sought after by bees. Frequently seen not at its best, existing in competition with roots of overgrowing trees. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, sunny or shady borders, copses or woodlands. Plant, Oct. to Feb. Prune, Oct. to Feb., simply thinning out old or decayed wood.

PROPAGATION: By cuttings, 6 to 8 in. long, of firm wood inserted in ordinary soil in shady position outdoors, Oct. to Feb.; suckers removed and planted, Oct. to Feb.

SPECIES CULTIVATED: *S. albus* (syn. *S. racemosus*), 'Snowberry', pink or rose, July, berries white, 8 to 10 ft., N. America, with var. *laevigatus*, larger berries, freely borne, the best garden form; *occidentalis*, 'Wolfberry', pink, July, berries white, 4 to 6 ft., N. America; *orbiculatus*, white, Aug. to Sept., berries purplish-red, 3 to 7 ft., Eastern U.S.A.

Symphyandra (Pendulous Bell-flower)—*Campanulaceae*. Hardy perennials resembling Campanulas. First introduced early nineteenth century.

CULTURE: Soil, ordinary rich. Position, sunny well-drained borders or rockeries. Plant, Oct., March or April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in ordinary light, sandy soil outdoors, April to May; cuttings of young shoots inserted in sandy soil in cold frame, March or April; division of roots, March.

SPECIES CULTIVATED: *S. Hofmannii*, white, summer, 1 to 2 ft., Bosnia; *pendula*, straw yellow, summer, 9 to 12 in., Caucasus; *Wanneri*, blue, summer, 6 in., S.E. Europe.

Symphytum (Comfrey)—*Boraginaceae*. Hardy herbaceous perennials. The common comfrey, *S. officinale*, is not suitable for garden culture. First introduced late eighteenth century.

CULTURE: Soil, ordinary. Position, sunny or shady, moist borders or margins of streams. Plant, Oct. to Nov. or March to April. Lift, divide and replant every three or four years.

PROPAGATION: By division of roots in spring.

SPECIES CULTIVATED: *S. asperum* (syn. *S. asperrimum*), 'Prickly Comfrey', rose changing to blue, 3 to 6 ft., Caucasus; *caucasicum*, blue, 1 to 2 ft., Caucasus; *grandiflorum*, yellowish-white, 9 to 18 in., Caucasus; *Leonhardtianum*, pale yellow, summer, 6 to 12 in., Cent. Europe; *officinale*, 'Common Comfrey', white or dull purple, 2 to 4 ft., Europe, including Britain, vars. *coccineum* (syn. *S. bohemicum*), crimson, *luteo-marginatum*, leaves bordered with yellow; *orientale*, creamy white, 2 ft., Turkey; *peregrinum*, rose changing to blue, 3 to 6 ft., Caucasus; *tauricum*,

yellowish-white, 1 to 1½ ft., Crimea, S. Europe, Russia; *tuberosum*, yellowish-white, summer, 8 to 20 in., S.W. Europe, naturalised in Britain.

Synthyris—*Scrophulariaceae*. Hardy herbaceous perennial. First introduced late nineteenth century.

CULTURE: Soil, loamy. Position, partially shady beds or rock gardens. Plant, Oct. to Nov. or March to April. Water freely during summer months.

PROPAGATION: By division in spring; seeds sown in sandy soil in pans in cold greenhouse or frame during March and April.

SPECIES CULTIVATED: *S. laciniata*, blue, early summer, 6 in., N. America; *pinnatifida*, purple, summer, 6 to 9 in., N. America; *reniformis*, blue, early summer, 6 in., Western N. America; *rotundifolia*, blue, summer, 6 in., N. America, and var. *alba*, white.

Syringa (Lilac)—*Oleaceae*. Hardy deciduous flowering shrubs. The name *Syringa* is frequently erroneously applied to the Mock Orange, correctly named *Philadelphus*. First introduced late sixteenth century.

CULTURE: Soil, ordinary good. Position, sunny borders or shrubberies. Plant, Oct. to Feb. Prune moderately after flowering (June), removing all shoots with spent flowers, and thinning out the weaker shoots. Allow no suckers to grow from roots. The special coloured named vars. of the Common Lilac require feeding. Give annual dressing of bonemeal, 2 oz. per square yard in spring, or on lighter soils a generous mulch of manure or compost.

POT CULTURE FOR FORCING: Compost, two parts good sandy loam, one part leaf-mould and little sand. Pot, Oct. or Nov. Place plants after potting in sheltered corner outdoors, protecting pots from frost with litter until required for forcing. Transfer to temp. of 55°, Nov. to Feb. Syringe daily. Water moderately. Directly buds burst place in temp. of 60° to 65°; when expanded replace in temp. of 55°. Prune shoots that have flowered to within 2 in. of base directly after blooming. Keep plants in heat until May, then gradually harden and plant outdoors. Plants must not be forced two years in succession. Lilacs may be grown in cold greenhouse for flowering in April and May. Place in greenhouse in Nov.

PROPAGATION: Named vars. by layering in spring or autumn; grafting, either on common lilac or on privet is sometimes practised, from such plants suckers will be either common lilac or privet. Suckers from layered plants will resemble the parent. Cuttings of all types, of half-ripened wood in cold frame, Aug. to Sept. Removal of rooted suckers of common lilac or of species.

SPECIES CULTIVATED: *S. amuriensis*, 'Amur Lilac', yellowish-white, June to July, to 12 ft., Manchuria, China, var. *japonica*; *chinensis*, 'Rouen Lilac', mauve, May, 10 to 15 ft., elegant habit, hybrid, with vars. *alba*, white, *duplex*, double, *rubra*, deep rose, and *metensis*, slate blue; *emodi*, 'Himalayan Lilac', white or purple tinted, June, 10 to 15 ft., Himalaya; *Josikaea*, 'Hungarian Lilac', deep lilac, June, 10 to 12 ft., Hungary; *Julianae*, violet, May to June, 4 to 6 ft., very fragrant, W. China; *Komarowii*, purplish pink, 10 to 15 ft., W. China; *microphylla*, pale lilac, June, 3 to 5 ft., N. China; *pekinensis*, creamy white, June, slender habit, 15 to 25 ft., N. China, with var. *pendula*, graceful weeping form; *persica*, 'Persian Lilac', mauve, May, fragrant, good miniature shrub for small gardens, 4 to 6 ft., Afghanistan, with vars. *alba*, white, and *laciniata*, cut-leaved; *reflexa*, rose pink, pendulous flower spikes, June, 10 to 12 ft., Cent. China; *Sweginzowii*, reddish to pale lilac, May to June, 6 to 9 ft., N.W. China; *tomentella*, pink, yellow anthers, May to June, 6 to 8 ft., W. China; *velutina*, lavender, June, 6 to 8 ft., N. China, Korea; *villosa*, lilac pink, early June, vigorous and free-flowering, N. China, with var. *alba*, flesh pink buds changing to white; *vulgaris*, 'Common Lilac', very fragrant, May, 10 to 20 ft., E. Europe; *Wolfii*, lilac pink, May to June, large spikes and foliage, 10 to 15 ft., Manchuria and Korea; *yunnanensis*, 'Yunnan Lilac', purplish-pink fading to white, June, 10 to 12 ft., Yunnan, with var. *rosea*, clear rose-pink.

Tabernaemontana—*Apocynaceae*. Stove evergreen flowering shrubs. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part fibrous peat, half a part silver sand. Position, well-drained pots in light stove. Pot, Feb. to April. Prune straggling shoots moderately closely immediately after flowering. Water freely March to Oct., moderately afterwards. Syringe daily March and until flowers appear. Temp., March to Sept. 70° to 80° , Sept. to March 65° to 75° .

PROPAGATION: By cuttings of ripe shoots, 2 to 3 in. long, inserted in small pots filled with sand under bell-glass in temp. 65° to 75° in Feb.

SPECIES CULTIVATED: *T. Barteri*, white, summer, 6 ft., Trop. Africa; *citrifolia*, yellow, summer, to 15 ft., W. Indies, Mexico; *grandiflora*, yellow, summer, to 6 ft., Venezuela and Guiana; *recurva* (syn. *T. gratissima*), yellowish-white, June, 6 ft., Chittagong and Tenasserim.

Tacca—Taccaceae. Stove perennial herbs. First introduced late eighteenth century.

CULTURE: Compost, equal parts loam, peat and sand. Position, well-drained pots in warm greenhouse. Water freely during summer months, very little during winter. Temp., March to Sept. 75° to 85° , Sept. to March 60° to 65° . Pot, Feb. or March.

SPECIES CULTIVATED: *T. cristata* (syn. *Ataccia cristata*), brownish-purple, summer, purplish-green foliage, 2 ft., Malaya; *laevis*, greenish-violet, July, 1 ft., India; *pinnatifida*, green and purple, June, 3 to 4 ft., Trop. Asia, Africa and Australia.

Tagetes (Marigold)—Compositae. Half-hardy annuals. First introduced late sixteenth century.

CULTURE: Soil, ordinary, well enriched with decayed manure. Position, sunny borders for African Marigold; sunny beds or borders for French and Mexican Marigolds; edgings to beds or borders for *T. signata pumila*. Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 55° in March, or in unheated greenhouse in April. Transplant seedlings when three leaves form 3 in. apart in light soil in shallow boxes, or in bed of rich soil in cold frame, gradually harden off in May, and plant out in June. Plant African Marigolds in groups of three or six, or 16 in. apart in rows; French Marigolds singly, or in groups in borders, or 15 in. apart in rows; Dwarf Marigolds (*T. signata pumila*) 6 in. apart in rows. African Marigold for exhibition to carry four blooms only. Thin shoots to four on each plant, each carrying one bloom. Water freely in dry weather. Apply stimulants when growing.

SPECIES CULTIVATED: *T. erecta*, 'African Marigold', yellow, summer, 2 to 3 ft., Mexico; *lucida*, 'Mexican Marigold', yellow, summer, 1 ft., Mexico; *patula*, 'French Marigold', orange, red, and brown, summer, 1 to $1\frac{1}{2}$ ft., Mexico, and var. *nana*; *signata*, yellow, summer, 1 to $1\frac{1}{2}$ ft., Mexico, and var. *pumila*.

Talinum—Portulacaceae. Perennial, more or less fleshy herbs, sometimes woody at base.

CULTURE: As for *Lewisia*, to which they are nearly related.

PROPAGATION: By seeds sown in early spring.

SPECIES CULTIVATED: *T. okanaganense*, off-white, early summer, $\frac{1}{2}$ in., N. America; *spinescens*, pink, summer, 9 in., N. America.

Tamarind, see *Tamarindus indica*.

Tamarindus—Leguminosae (or Caesalpinaceae). Stove evergreen flowering tree. First introduced mid-seventeenth century.

CULTURE: Compost, two parts fibrous loam, one part sand. Position, large well-drained pots or tubs in lofty stove. Pot or plant, Feb. Water copiously April to Oct., moderately afterwards. Syringe daily April to Sept. Shade from sun. Temp., April to Oct. 70° to 85° , Oct. to April 60° to 70° .

PROPAGATION: By seeds steeped for a few hours in tepid water and then sown $\frac{1}{4}$ in. deep in light soil in temp. 75° to 85° in spring; cuttings of shoots inserted singly in small well-drained pots placed under bell-glass in temp. 65° to 75° , March to Aug.

SPECIES CULTIVATED: *T. indica*, 'Tamarind', pale yellow, summer, 40 to 80 ft., Tropics.

Tamarix (Tamarisk)—*Tamaricaceae*. Hardy evergreen and deciduous flowering shrubs.

CULTURE: Soil, ordinary or sandy. Position, shrubberies or hedges in seaside gardens; sunny banks or shrubberies in inland gardens south of the Trent. Plant, Sept. to April. Tamarisk makes an excellent seaside hedge interplanted with *Atriplex Halimus*; make a double row, planting 1 ft. apart each way. Prune *T. parviflora*, *juniperina* and *tetrandra* immediately after flowering in June, removing older wood. Other kinds should be pruned hard in winter or early spring, either to the ground or to a framework of older wood.

PROPAGATION: By cuttings of shoots, 4 to 6 in. long, inserted in sandy soil out of doors, Oct. to Nov. Hedges may be formed by planting stems up to a yard in length which will root readily.

EVERGREEN SPECIES CULTIVATED: *T. anglica*, 'Common Tamarisk', white and pink, Aug. to Oct., 3 to 10 ft., Europe (Br.); *gallica*, pink, late summer and autumn, 10 to 30 ft., S. Europe.

DECIDUOUS SPECIES CULTIVATED: *T. hispida*, pink, glaucous foliage, Aug. to Sept., 3 to 4 ft., Caspian rather tender; *juniperina* (syn. *T. chinensis*), bright pink, May, 10 to 15 ft., N. China and Japan; *pentandra* (syn. *T. hispida aestivalis*), rosy pink, July to Aug., 12 to 15 ft., S.E. Europe and Asia Minor; *tetrandra*, pink, May, 10 to 15 ft., Medit. Region. (Note: This shrub is listed sometimes under such names as *africana*, *algerensis* and *caspica*.) See also *Myricaria*.

Tanacetum (Tansy)—*Compositae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary. Position, sunny beds for *T. vulgare*; open rock gardens for *T. argenteum* and *Herderi*. Plant *T. vulgare* 12 in. apart in rows 18 in. asunder in March or Oct.; remove flower stems as they form; replant every three or four years; leaves aromatic, used for flavouring puddings, etc., and for garnishing.

PROPAGATION: By seeds sown outdoors in spring; division of the roots in Oct. or March.

SPECIES CULTIVATED: *T. argenteum*, yellow, summer, silvery foliage, 9 in., Asia Minor; *Herderi*, yellow, summer, silvery-white foliage, 9 in., Turkistan; *vulgare*, yellow, summer, 3 ft., Britain, var. *crispum*, finer, more crisped leaves.

Tanakaea (Japanese Foam Flower)—*Saxifragaceae*. Dwarf evergreen perennial with leathery, fringed, rich green leaves.

CULTURE: Soil, light, containing plenty of humus. Position, woodland or partially shaded cool border. Plant in colonies in spring.

PROPAGATION: By division of tufts in March.

SPECIES CULTIVATED: *T. radicans*, white, April to June, 6 to 9 in., Japan.

Tansy, see *Tanacetum*.

Tape Grass, see *Vallisneria*.

Tapioca, see *Manihot esculenta*.

Taraxacum (Dandelion)—*Compositae*. Hardy perennial herb; a weed in most parts of the world and cultivated solely for its blanched leaves for saladings.

CULTURE: Soil, ordinary deep, free from recent manure. Position, sunny. Sow seeds, 1 in. deep, in drills 12 in. apart in April. Thin seedlings to 6 in. apart in rows in May. Remove flower stems directly they form. Lift roots in Nov. and store in sand in cool place. Plant roots almost touching in boxes or large pots in ordinary soil. Cover pots, etc., to exclude light. Place in warm greenhouse between Nov. and April. Keep soil moist and cut leaves when 3 to 6 in. long for salads. Destroy roots afterwards. Make a fresh sowing annually.

SPECIES CULTIVATED: *T. officinale*, yellow, spring, Britain.

Taro, see *Colocasia esculenta*.

Tarragon, see *Artemisia Dracunculus*.

Taxodium (Deciduous Cypress, Swamp Cypress)—*Pinaceae* (or *Taxodiaceae*). Hardy deciduous coniferous trees. Leaves, feather-shaped, deciduous, bright green, changing to dull red in autumn. Habit, pyramidal when young; broad, cedar-like when full grown. First introduced early seventeenth century.

CULTURE: Soil, moist loam. Position, margins of ponds and rivers or in damp places; growth less satisfactory in dry places. Plant, Oct. to Feb.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in pans of light soil in cold frame in April, transplanting seedlings singly into small pots following spring, and planting outdoors the year after; cuttings of ripened shoots in shady, cold frame and sandy soil in Sept. or Oct., and kept moist; layering branches in spring.

SPECIES CULTIVATED: *T. distichum*, 70 to 100 ft., S.W. States, and var. *pendens*, branches drooping.

Taxus (Yew)—*Taxaceae*. Hardy evergreen trees. Timber used for cabinet making, but too slow in growth to cultivate for that purpose. Leaves poisonous to cattle. Estimated average age, 1000 to 2000 years.

CULTURE: Soil, good deep ordinary loam is the most suitable, although the yew will grow in any soil, including chalk, but cultivation should be deep prior to planting. Position, sunny or shady shrubberies for common kinds; sunny shrubberies, lawns or borders for variegated and Irish yews. Plant, Sept. to Nov., April to May. Prune, April or May.

POT CULTURE: Most suitable kind is *T. baccata elegantissima*. Pot, Oct. or Nov. Compost, two parts good ordinary soil, one part leaf-mould. Water moderately Nov. to April, freely afterwards. Keep in cold greenhouse, balcony or corridor, Oct. to May; outdoors afterwards, pots plunged to rims in cinders or soil.

HEDGE CULTURE: Suitable kinds—Common, gold and silver striped, upright English and Irish yews. Position, sunny. Soil, good moist ordinary, previously trenched two spits deep and 3 ft. wide. Plant, Oct., Nov., March or April. Distance for planting: 18 in. for trees 2 ft. high, 2 ft. for trees 3 ft. high, and 3 ft. for trees 3 to 5 ft. high. Clipping is best done twice yearly, in May and July. Do not carry out this work before the former or after the latter month. The common yew, or its golden form, is the best-known subject for training and clipping for topiary work. Previous instructions for trimming apply for these specimens also.

PROPAGATION: By seeds sown 1 in. deep in light soil outdoors in March, or $\frac{1}{4}$ in. deep in pans or boxes of light soil in cold frame or greenhouse in March, transplanting seedlings in nursery bed when large enough to handle; cuttings of shoots inserted in sandy soil under hand-light or in cold frame in Sept.; grafting variegated kinds on common yew in March; layering in Sept.

SPECIES CULTIVATED: *T. baccata*, 'Common Yew', 50 ft., Europe, N. Asia, numerous vars. including *aurea*, yellow leaves, *elegantissima*, compact, *erecta*, upright, bushy, *lutea*, yellow fruit, *stricta*, 'Irish Yew', *procumbens*, prostrate; *canadensis*, 'Canadian Yew', to 6 ft., Canada; *cuspidata*, 'Japanese Yew', to 50 ft., Japan, var. *nana*, shrubby.

Tea, see *Thea sinensis*; -berry, see *Gaultheria procumbens*.

Teak, see *Tectona grandis*.

Tecoma, see *Bignonia*, *Campsis*, *Pandorea* and *Tecomaria*.

Tecomaria—*Bignoniaceae*. Greenhouse evergreen shrubs, partly climbing, with yellow to scarlet, curved funnel-shaped flowers in dense terminal racemes or panicles.

CULTURE: As *Pandorea*.

PROPAGATION: By seed; cuttings.

SPECIES CULTIVATED: *T. capensis* (syn. *Tecoma capensis*), 'Cape Honeysuckle', orange-red or scarlet, summer, 10 to 20 ft., S. Africa.

Tecophilaea—*Haemodoraceae*. Half-hardy bulbous plant. First introduced mid-nineteenth century.

CULTURE: Soil, two parts sandy loam, one part decayed cow manure. Position,

well-drained bed in cold frame or at foot of south wall, or pots in cool greenhouse. Plant bulbs 3 in. deep and 6 in. apart, Aug. to Nov. Pot, singly in $3\frac{1}{2}$ in. pots or three in a 5 in. pot and 2 in. deep. Cover pot with ashes or fibre refuse till growth begins. Water moderately; keep dry after foliage turns yellow until growth recommences. No artificial heat required. Admit air freely to plants in pots and frames after Feb.

PROPAGATION: By offsets, removed at potting time.

SPECIES CULTIVATED: *T. cyanocrocus*, 'Chilean Crocus', blue and white, fragrant, spring, 6 in., Chile, and var. *Leichtlinii*, blue.

Tectona—*Verbenaceae*. Stove tree, of economic interest only, furnishing the teak of commerce. First introduced mid-eighteenth century.

CULTURE: Soil, loam, leaf-mould and sand. Position, large well-drained tubs or borders in heated greenhouse. Temp., March to Sept. 75° to 85° , Sept. to March 60° to 65° . Plant or pot, March or April.

PROPAGATION: By seeds sown in sandy soil in temp. 85° during Feb. or March.

SPECIES CULTIVATED: *T. grandis*, 'Teak', to 150 ft., India and Malaya.

Telanthera, see *Alternanthera*.

Telegraph Plant, see *Desmodium motorium*.

Tellima—*Saxifragaceae*. Hardy herbaceous hairy perennial. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open or partially shady borders or wild gardens. Plant, autumn or spring.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *T. grandiflora*, greenish, April to June, 2 ft., N. America.

Telopea—*Proteaceae*. Greenhouse evergreen shrub. First introduced late eighteenth century.

CULTURE: Soil, sandy loam. Position, well-drained pots or tubs in greenhouse. Water very freely during summer, sparingly in winter. Dryish atmosphere essential at all seasons. Temp., March to Sept. 55° to 65° , Sept. to March 45° to 55° .

PROPAGATION: By cuttings of young shoots inserted in sandy soil under bell-glass in gentle bottom heat during May or June.

SPECIES CULTIVATED: *T. speciosissima*, 'Waratah', red, June, 8 ft., Australia.

Ternstroemia—*Theaceae* (or *Ternstroemiaceae*). Slightly tender evergreen flowering shrub with leathery shiny leaves, bronze-tinted when young.

CULTURE: Soil, ordinary, well drained. Position, sheltered shrubberies in southern counties or borders in conservatories and unheated greenhouses. Plant, Sept. to Oct. or April to May.

PROPAGATION: By cuttings of young shoots inserted in sandy soil under bell-glass in gentle bottom heat during May, June or July.

SPECIES CULTIVATED: *T. japonica*, yellowish-white, fragrant, July to Aug., to 20 ft., Japan.

Testudinaria—*Dioscoreaceae*. Greenhouse deciduous climber. *T. elephantipes* has a remarkable tuberous root, frequently as much as 3 ft. in diameter; it is sometimes cooked and eaten by natives. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts fibrous loam, turfy peat and sand. Position, well drained in sunny greenhouse. Pot, Feb. or March. Water moderately April to Sept., keep nearly dry afterwards. No shade required. Temp., March to Sept. 55° to 65° , Sept. to March 40° to 50° .

PROPAGATION: By cuttings of firm side shoots inserted in sandy loam under bell-glass in temp. 45° to 55° in spring, or cuttings of young shoots when 1 to 2 in. long inserted in sandy loam under bell-glass in similar temp., spring or summer.

SPECIES CULTIVATED: *T. elephantipes*, 'Hottentot Bread', 'Elephant's Foot', yellow, summer, 5 to 10 ft., S. Africa.

Tetracentron—*Magnoliaceae*. Rare hardy deciduous ornamental tree with no beauty of flower but has elegant foliage. First introduced early twentieth century.

CULTURE: Soil, well-drained loam. Position, as specimens on lawns or in similar open places. Requires shelter from early spring frosts. Plant, Nov. to Feb.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in Feb. or March in well-drained pans of sandy soil in a cold frame or greenhouse; layering in spring.

SPECIES CULTIVATED: *T. sinense*, 50 to 90 ft., young growths purple-tinted, W. China.

Tetragonia—*Aizoaceae*. Annual with leaves and young shoots succulent, used as a summer vegetable as a substitute for spinach. First introduced mid-eighteenth century.

CULTURE: Site, trenched, well manured, porous soil in sunny position. Sow in boxes in warm greenhouse for early crops or outside end April. Thin to 1 ft.

SPECIES CULTIVATED: *T. expansa*, 'New Zealand Spinach', leaves 5 in., Japan, Australia, New Zealand, S. America.

Tetramicra, see *Leptotes bicolor*.

Tetrapanax (Rice-paper Tree)—*Araliaceae*. Evergreen greenhouse or half-hardy shrub; in Orient used for making rice-paper. First introduced mid-nineteenth century.

CULTURE: Compost, fibrous loam, peat, leaf-mould and sand. Pot, Feb. to April. Water freely March to Oct., moderately at other times. Temp., March to Sept. 60° to 70°, Sept. to March 50° to 60°.

PROPAGATION: By cuttings or portions of the stem in sand in propagating case in April.

SPECIES CULTIVATED: *T. papyrifera* (syns. *Aralia papyrifera*, *Fatsia papyrifera*), greenish shrub or small tree, Formosa. A useful subject for sub-tropical garden during summer.

Tetratheca—*Tremandraceae*. Greenhouse evergreen flowering shrubs and half-hardy perennial plants. First introduced early nineteenth century.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts fibrous peat, one part turfy loam, one part equal amounts charcoal, broken pots and silver sand. Position, well-drained pots in light airy greenhouse. Pot, Feb. or March. Water moderately at all seasons; rainwater only to be used. Shade from sun June to Sept. Temp., Oct. to April 40° to 50°, April to Oct. 50° to 65°.

CULTURE OF HALF-HARDY SPECIES: Soil, rich loam, well drained. Position, warm, sunny and sheltered.

PROPAGATION: By cuttings of side shoots inserted in sand under bell-glass in shade in temp. 55° to 65° summer, for greenhouse species; seeds sown in spring for others.

GREENHOUSE SPECIES CULTIVATED: *T. ericifolia*, rose, summer, 1 ft., Australia; *thymifolia*, purple, July to Aug., 1 ft., Australia.

HALF-HARDY SPECIES CULTIVATED: *T. ciliata*, pink, summer, Tasmania; *glandulosa*, purple, 12 to 18 in., summer, Tasmania.

Teucrium (Germander)—*Labiatae*. Hardy perennial plants and slightly tender evergreen shrub.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny borders, sunny, dryish rockeries or old walls for *T. Marum*, etc. Plant, March or April.

CULTURE OF SHRUBBY SPECIES: Soil, light, well drained. Position, at base of sunny wall in sheltered gardens. Plant, Sept. to Oct. or April to May.

PROPAGATION: Shrubby species by cuttings of half-ripened shoots inserted in sandy soil in shaded frame in Aug.; perennial species by division in March or April.

PERENNIAL SPECIES CULTIVATED: *T. aureum*, yellow, July, 4 to 6 in., Medit. Region; *Chamaedrys*, rosy purple, July to Sept., 1 ft., Europe; *Marum*, 'Cat Thyme', purple, summer, 1 ft., S. Europe; *pyrenaicum*, cream and lilac, June to July, 1 to 2 in., Pyrenees; *Scordonia*, yellow, summer, to 2 ft., Britain, var. *variegatum*, variegated foliage.

SHRUBBY SPECIES CULTIVATED: *T. fruticans*, blue, summer and autumn, 7 to 8 ft., stems and undersides of leaves white, S. Europe.

Thalia—*Marantaceae*. Half-hardy aquatic perennials. First introduced late eighteenth century.

CULTURE: Soil, peaty loam. Position, tub in shallow pond. Plant in March. Requires a warm, sheltered spot. Place tubs in ponds in open from May to Sept. Remove tubs to frost-proof greenhouse, Sept. to May.

PROPAGATION: By division in spring.

HARDY SPECIES CULTIVATED: *T. dealbata*, purple, ornamental foliage, July, 6 ft., S. California.

Thalictrum (Meadow Rue)—*Ranunculaceae*. Hardy herbaceous perennials with foliage similar to Maidenhair Fern.

CULTURE: Soil, ordinary. Position, sunny borders for tall species, sunny rockeries for dwarf species. Plant, Oct. to March. Top-dress annually in Feb. or March with decayed manure. Lift, divide and replant only when absolutely necessary.

PROPAGATION: By division of roots in March or April.

SPECIES CULTIVATED: *T. alpinum*, yellowish-green, summer, 4 to 6 in., Northern and Arctic Regions; *aquilegifolium*, lilac, summer, 3 ft., Europe; *Chelidonii*, rosy lilac, summer, 6 in., Himalaya, requires sheltered position; *Delavayi*, lilac, June to July, 1½ to 3 ft., E. China; *dipterocarpum*, rosy lilac, summer, 5 to 7 ft., W. China, and var. *album*, white; *Fendleri*, yellowish-white, July, 2 to 3 ft., N. America; *flavum*, yellow, summer, 3 to 4 ft., Europe; *glaucum*, yellow, summer, 3 to 4 ft., S. Europe; *kiusianum*, rose purple, May to June, 6 in., Japan; *majus*, greenish-yellow, summer, 3 to 4 ft., Europe and Asia; *minus*, yellow, summer, 1 ft., Europe; *petaloideum*, white, June to Aug., 1½ ft., N. Asia.

Thea—*Theaceae* (or *Ternstroemiaceae*). Tender evergreen shrubs and trees. The tea of commerce is made from the leaves of *T. sinensis*.

CULTURE: As Camellia.

PROPAGATION: As Camellia.

SPECIES CULTIVATED: *T. cuspidata*, white, May, 6 ft., China; *sinensis* (syn. *Camellia Thea*), 'Tea', to 30 ft., flowers white, fragrant.

Thelesperma—*Compositae*. Hardy annual. Flowers suitable for cutting.

CULTURE: Soil, ordinary. Position, sunny borders. Sow seeds outdoors in April where plants are required to grow.

SPECIES CULTIVATED: *T. Burridgeanum* (syn. *Cosmidium Burridgeanum*), yellow and red-brown, summer, 18 in., Texas.

Thelypteris, see *Dryopteris*.

Theobroma (Cocoa Tree; Chocolate Tree)—*Sterculiaceae*. Stove evergreen tree. Fruit, oval, yellow or reddish, from the seeds of which cocoa is obtained. First introduced early eighteenth century.

CULTURE: Compost, equal parts fibrous loam and sand. Position, well-drained pots in moist, warm stove. Pot, Feb. Water freely March to Oct., moderately afterwards. Syringe daily April to Sept. Shade from sun. Prune into shape, Feb. Temp., Oct. to March 55° to 65°, March to Oct. 70° to 85°.

PROPAGATION: By cuttings of half-ripened shoots inserted in sand under bell-glass in temp. of 75° to 85°, April to Aug.; seed sown in Feb. to March in temp. 80°.

SPECIES CULTIVATED: *T. Cacao*, rose and yellow, summer, 15 to 20 ft., Trop. America.

Thermopsis—*Leguminosae*. Hardy herbaceous perennials. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, open sunny borders. Plant, March or April.

PROPAGATION: By seeds sown ½ in. deep in light, rich soil in sunny position out

doors in April, transplanting seedlings when large enough to handle; division in spring.

SPECIES CULTIVATED: *T. caroliniana*, golden yellow, summer, 4 to 5 ft., N. America; *fabacea*, yellow, June to July, 2 to 3 ft., Siberia; *montana*, golden yellow, summer, 1 to 2 ft., N. America.

Thlaspi—*Cruciferae*. Hardy perennial herbs. *T. latifolium* is now *Pachyphragma macrophyllum*. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, sunny rock gardens. Plant, spring or autumn.

PROPAGATION: By seed sown in pans of sandy soil in cold frame or greenhouse during March or April; division at planting time.

SPECIES CULTIVATED: *T. alpinum*, white, spring, 3 to 4 in., Europe; *bellidifolium*, rose-purple, summer, 2 to 3 in., Macedonia; *rotundifolium*, rosy lavender, summer, 2 to 3 in., Alps.

Thorn, see *Crataegus*; -**Apple**, see *Datura Stramonium*.

Thrift, see *Armeria*.

Thrinax—*Palmae*. Stove fan palms. First introduced late eighteenth century.

CULTURE: Compost, two parts loam, one part peat, and little sand. Position, well-drained pots in moist part of stove. Water copiously April to Oct., moderately afterwards. Syringe daily April to Sept. Moist atmosphere essential. Shade from sun. Temp., March to Oct. 70° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By seeds soaked for a few hours in tepid water and then sown $\frac{1}{2}$ in. deep in sandy loam in temp. of 75° to 85° any time.

SPECIES CULTIVATED: *T. excelsa*, 6 to 8 ft., Panama; *Morrisii*, 3 to 4 ft., W. Indies; *multiflora*, 6 to 10 ft., Dominica; *parviflora*, 'Royal Palmetto Palm', 25 to 30 ft., W. Indies.

Thuja (*Arbor-Vitae*)—*Pinaceae*. Hardy evergreen coniferous trees and shrubs, pyramidal in habit, leaves small and scale-like. Often spelled Thuya. First introduced late sixteenth century.

CULTURE: Soil, deep, moist loam. Position, open sunny shrubberies, lawns, banks or margins of water, dwarf forms suitable for rock garden. Plant, Sept. to Nov. and Feb. to April. Prune, April or Sept.

CULTURE IN POTS: Compost, two parts loam, one part leaf-mould. Pot, Sept. or Oct. Position, cold frame, window or cold greenhouse, Nov. to May; plunged to rim of pot in ashes or fibre in sunny spot outdoors afterwards. Water freely April to Oct., moderately afterwards.

HEDGE CULTURE: Soil, ordinary moist, previously trenched two spits deep and 3 ft. wide. Plant, Sept., Oct., March or April. Distance apart for planting: 2 ft. for trees up to 3 ft. high, 2½ ft. for trees to 4 ft., and 3 ft. for taller specimens. Nursery stock generally available up to 10 ft. or more high. Training or clipping best done twice yearly between May and July inclusive. Suitable species, *T. plicata*, *occidentalis* and *orientalis*.

PROPAGATION: By seeds in sandy soil in temp. 55° in spring, transplanting seedlings in open ground when large enough to handle; cuttings of shoots, 2 to 3 in. long, in sandy soil under bell-glass or in cold frame in Sept.; grafting in March.

SPECIES CULTIVATED: *T. koraiensis*, leaves white beneath, spreading habit, to 20 ft., Korea; *occidentalis*, 'American Arbor-Vitae', 50 to 60 ft., N.E. America, and vars. *Ellwangeriana*, low broad pyramid, *ericoides*, dwarf, *lutea*, bright yellow pyramidal form, *pendula*, branches drooping, *Vervaeneana*, small and dense, etc.; *orientalis* (syn. *Biota orientalis*), 30 to 40 ft., China, and vars. *elegantissima*, compact, bright yellow in spring, *decussata*, dwarf bushy form, *meldensis*, narrow pyramidal form, *stricta*, dense pyramid, etc.; *plicata* (syn. *T. Lobbii*), over 100 ft., N.W. America, and vars. *atrovirens*, leaves dark green, *fastigiata*, columnar form, *pendula*, drooping branches; *Standishii* (syn. *T. japonica*), 20 to 30 ft., Japan.

Thujopsis—*Pinaceae*. Hardy evergreen coniferous trees of pyramidal habit. Allied to Thuja.

CULTURE: See Thuja.

PROPAGATION: See Thuja.

SPECIES CULTIVATED: *T. dolabrata* (syn. *Thuja dolabrata*), to 50 ft., leaves dark green above, white patches below, Cent. Japan, and vars. *Hondai*, flat branches, taller growth, *nana*, dwarf, lighter green, *variegata*, tips creamy white.

Thunbergia—*Acanthaceae*. Stove and greenhouse evergreen flowering shrubs and perennials, mostly of climbing habit. First introduced late eighteenth century.

CULTURE OF *T. ALATA* AND *T. GIBSONII*: Compost, two parts loam, one part leaf-mould or decayed manure and one part sand. Sow seeds thinly in light compost in a well-drained pot, pan or box in temp. 65° to 75° in Feb. or March. Transplant seedlings when three leaves form singly in 3½ in. pots, and later on into 5 in. size. Place pots afterwards alongside of staging and let shoots hang down; or in baskets suspended from roof. May also be planted outdoors in June against sunny walls, in window boxes, or in vases. Water freely.

CULTURE OF OTHER SPECIES: Compost, equal parts leaf-mould or well-decayed manure, peat, fibrous loam and silver sand. Position, well-drained pots in shady part of stove during growing period; light part during the resting period for *T. erecta*; well-drained beds, with shoots trained up roof, for *T. mysorensis*, etc. Pot, Feb. or March. Prune moderately, Feb. Water freely March to Sept., moderately Sept. to Nov., keep nearly dry Nov. to March. Syringe daily March to Sept. Apply stimulants occasionally May to Sept. Temp., Feb. to Oct. 65° to 75°, Oct. to Feb. 55° to 65°.

PROPAGATION: By seeds sown ¼ in. deep in sandy peat and leaf-mould in temp. 75° to 85°, Jan. to May; cuttings of firm young shoots, 2 to 3 in. long, inserted in leaf-mould, peat and sand under bell-glass in temp. 75° to 85°, Feb. to June.

SPECIES CULTIVATED: *T. alata*, cream and dark purple, summer, 4 to 6 ft., Trop. Africa, and several colour forms; *chrysops*, purple with yellow eye, June, 3 ft., Trop. Africa; *coccinea*, scarlet, summer, 8 to 10 ft., India; *erecta* (syn. *Meyenia erecta*), purple and pale yellow, summer, 6 ft., Trop. Africa, and var. *alba*, white; *fragrans*, white, fragrant, summer, 8 to 10 ft., Trop. Asia; *Gibsonii*, orange, summer, 10 to 15 ft., Trop. Africa; *grandiflora*, blue, July to Sept., 10 to 15 ft., India, and var. *alba*, white; *laurifolia* (syn. *T. Harrisii*), pale blue and white, summer, 10 to 15 ft., Malaya; *mysorensis*, yellow and purple, spring, 10 to 15 ft., S. India; *natalensis*, yellow and blue, July, 2 to 3 ft., S. Africa; *Vogeliana* (syn. *Meyenia Vogeliana*), bluish-violet and yellow, summer, Trop. Africa.

Thunia—*Orchidaceae*. An epiphytal (terrestrial under suitable conditions) genus.

CULTURE: Compost, two-thirds of rough fibrous loam, the other third of sphagnum moss and peat with finely broken potsherds or sand. Well-drained pots. In summer, atmosphere should be tropical, if shading is required it should be very light. Syringe may be used freely and manure water given as for *Calanthes*, but continued until the leaves yellow after flowering. When foliage has fallen, or nearly so, place in a temp. about 50° in a light position. Withhold water.

PROPAGATION: In early summer the old stems may be cut into lengths, two or more nodes, and laid on sand or fibre in a propagating case, the growths being potted as roots are seen. The piece of the old stem may be removed.

SPECIES CULTIVATED: *T. alba*, white, lip white with yellow or purple-marked fringed keels, summer, N. India, var. *nivalis*, pure white; *Bensoniae*, amethyst-purple, lip with many yellow-fringed keels, very handsome, summer, Burma, var. *superba*, deep rose-purple, keel bronze; *Brymeriana*, white or purple-flushed, lip crimson-purple, keels yellow, tinted red, summer, Burma, a supposed hybrid.

Thuja, see Thuja.

Thymus (Thyme)—*Labiatae*. Hardy aromatic evergreen or semi-evergreen shrubs and sub-shrubs.

CULTURE OF GARDEN THYME: Shoots used largely for culinary purposes. Soil, light, rich ordinary. Position, sunny, warm border. Plant 4 in. apart in rows

8 in. asunder, March or April. Replant every three or four years. Gather shoots when blossoms appear and dry for winter use.

CULTURE OF OTHER SPECIES: Soil, light and poor with sand or gravel, well drained. Position, sunny rockeries and dry walls in full sun. Plant, Oct. or March. Excellent plants for carpeting bare spots over spring bulbs.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in lines 8 in. apart in April, thinning seedlings to 4 in. apart in May or June; division of plants in March or April, each portion being furnished with a few roots; gold and silver kinds by cuttings in cold frames in summer.

SPECIES CULTIVATED: *T. carnosus*, white, Aug. to Sept., 9 in., Spain; *glabra* (syn. *T. Chamaedrys*), light purple, summer, 3 in., Europe; *Herba-barona*, light purple, summer, foliage scented like caraway seed, 6 in., Corsica; *nitidus*, rosy lilac, June, 9 in., Sicily; *pectinatus* (syn. *T. odoratissimus*), pale purple, summer, 2 in., Russia; *Serpyllum*, 'Wild Thyme', rosy purple, June, prostrate, Europe (Br.), and vars. *albus*, white, *coccineus*, carmine, *lanuginosus*, woolly-leaved, and *vulgaris* (syn. *T. citriodorus*), lemon scented; *vulgaris*, 'Garden Thyme', purple, June, 6 in., S. Europe.

Thyrsacanthus, see *Odontonema*.

Tiarella—*Saxifragaceae*. Hardy perennial herb. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, cool, shady beds or rock gardens. Plant, March or April.

PROPAGATION: By division of roots in March or April.

SPECIES CULTIVATED: *T. cordifolia*, 'Foam Flower', 'False Mitrewort', white, June, 1 ft., Eastern N. America; *polyphylla*, white, summer, $1\frac{1}{2}$ ft., Himalaya, China; *unifoliata*, creamy white, summer, 2 ft., Western N. America; *Wherryi*, white, May to June, 1 ft., Eastern N. America.

Tibouchina (Brazilian Spider-flower)—*Melastomaceae*. Greenhouse flowering shrubs. Evergreen. First introduced mid nineteenth century.

CULTURE: Compost, two parts turfy loam, one part peat, and one part charcoal and sand. Position, well-drained pots, tubs, or beds. Pot or plant, Feb. or March. Prune into shape after flowering. Water freely April to Sept., moderately afterwards. Temp. March or Sept. 60° to 70°; Sept. to March 50° to 60°.

PROPAGATION: By cuttings of firm side shoots, 3 in. long, inserted singly in small pots of sandy soil under bell-glass or in propagator in temp. of 70° to 80°. Feb. to Sept.

SPECIES CULTIVATED: *T. elegans*, purple, June, 6 ft. Brazil; *semidecandra* (Syn. *Lasiandra* or *Pleroma macranthum*), purple, summer, 10 ft., Brazil.

Tick Clover, see *Desmodium*; **-Trefoil**, see *Desmodium*.

Tidytips, see *Layia elegans*.

Tiger Flower, see *Tigridia Pavonia*; **-Nut**, see *Cyperus esculentus*.

Tigridia (Tiger Flower; Tiger Iris)—*Iridaceae*. Half-hardy or greenhouse bulbs. Blooms last in perfection one day only. First introduced late eighteenth century.

OUTDOOR CULTURE: Soil, equal parts rich loam and leaf-mould with a liberal addition of sand, in partially shaded bed prepared by digging out soil to depth of 24 in.; place 6 in. of brickbats or clinkers in bottom and remainder compost; or for ordinary culture an open, sunny border and any good soil. Plant bulbs 3 in. deep, 5 to 6 in. apart, placing little sand under and round each in April. Mulch with decayed manure and peat when 3 in. high. Water freely in dry weather. Lift bulbs in Oct., tie in small bundles, and suspend in cool, airy, frost-proof place until following April.

POT CULTURE: Compost, two parts sandy loam, one part peat and one part sand. Pot the bulbs singly in $4\frac{1}{2}$ in. pots in March or April. Cover pots with cinder ashes or peat in cold frame or under stage in cold greenhouse until growth

begins, then remove to light. Water moderately after growth begins; freely when well advanced. Apply weak stimulants occasionally when flower stems show. Position when in flower, light airy greenhouse or cold sunny frame. After flowering gradually withhold water until foliage turns yellow, then keep quite dry. Remove bulbs from soil, tie into bundles, and suspend in cool place until potting time the following April.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in light compost in temp. 55° to 65° , spring; offsets, removed and treated as advised for old bulbs in April.

SPECIES CULTIVATED: *T. Pavonia*, red, yellow, and purple, summer, 1 to 2 ft., Mexico, and vars. *alba*, white, *aurea*, yellow, and *conchiflora*, rich yellow, etc. See also *Cypella*.

Tilia (Lime Tree; Linden; Basswood)—*Tiliaceae*. Hardy deciduous trees.

CULTURE: Soil, good ordinary or loamy, moist. Position, sunny, as specimen trees on lawns or as screens. Also suitable for training over arches to form a shady path in summer; will stand severe pruning and may be trained (pleached) as mop-headed or other shaped specimens. Plant, Oct. to March. Prune, Nov. to Feb. Not suitable for dry soils or exposed places. Timber, soft, pale yellow or white, used chiefly for toy making, carving, leather-cutting boards, musical instruments, etc. Weight of cubic foot of timber, 28 lb. Number of seeds to a pound, 5000. Age at which timber reaches maturity, 30 years. Average life, 800 to 1000 years.

PROPAGATION: By seed sown in well-drained light soil in cold frame in March; layering shoots in autumn; grafting on common species in March for choice kinds.

SPECIES CULTIVATED: *T. americana*, 'American Lime', large leaves, 60 to 120 ft., E. and Cent. N. America; *cordata*, 'Small-leaved Lime', neat habit, slow growing, 50 to 90 ft., Europe, including Britain; *euchlora*, one of the handsomest, good foliage and habit, 40 to 60 ft., hybrid; *europaea* (syn. *T. vulgaris*), 'Common Lime', unsatisfactory early shedding of leaves, to 130 ft., hybrid; *heterophylla* (syn. *T. Michauxii*), large leaves, white beneath, 70 to 80 ft., Eastern N. America; *Maximowicziana*, round leaves, hardy, 70 to 90 ft., Japan; *Moltkei*, very vigorous, pyramidal, 40 to 60 ft., hybrid; *mongolica*, 'Mongolian Lime', very hardy and graceful small tree, 20 to 30 ft., N. China and Mongolia; *petiolaris*, 'Pendent Silver Lime', graceful and very sweet scented, often overpowering bees, 60 to 90 ft., origin doubtful, possibly S.E. Europe; *platyphyllos*, 'Large-leaved Lime', superior to Common Lime, to 120 ft., Cent. and S. Europe, with numerous vars. *laciniata*, cut-leaved, *rubra*, red-twiggged lime, *aurea*, golden-twiggged, *pyramidalis*, fastigiate habit, and *vitifolia*, leaves lobed; *tomentosa* (syn. *T. argentea*), 'White Lime', leaves silvery beneath, handsome, broadly pyramidal tree, 60 to 100 ft., S.E. Europe.

Tillaea—*Crassulaceae*. Dwarf, annual aquatics used submerged in ponds or aquariums or as carpeting plants at borders of ponds or streams. Small green leaves, inconspicuous flowers.

CULTURE: Soil, muddy or sandy loam. Plant, spring, in soil at margins, or weight portions with small pieces of lead and sink into water if wanted for oxygenating purposes.

PROPAGATION: By division in spring.

SPECIES CULTIVATED: *T. aquatica*, 3 in., Europe; *recurva*, 4 in., Australia.

Tillandsia—*Bromeliaceae*. Stove epiphytal perennials.

CULTURE: Compost, equal parts fibrous loam, rough peat, silver sand and leaf-mould. Pot, Feb. or March. Water copiously March to Oct., moderately afterwards. Shade from sun. Syringe daily April to Sept. Moist atmosphere essential in summer. Temp., Sept. to March 60° to 70° , March to Sept. 70° to 80° .

PROPAGATION: By offsets, inserted in small pots of sandy peat in temp. 75° to 85° in spring. *T. usneoides* may be grown suspended from roof by a wire or fastened to a piece of wood; no soil required.

SPECIES CULTIVATED: *T. circinata* (syn. *T. streptophylla*), lilac, 1 ft., W. Indies and Cent. America; *fasciculata*, blue, 2 ft., W. Indies and Cent. America;

Lindeniana, bluish-purple, summer, 1 ft., Peru; *usneoides*, 'Spanish Moss' greenish-red, July, stems slender and pendent, to 20 ft. See also *Cryptanthus*, *Vriesia* and *Guzmania*.

Tithonia—*Compositae*. Tender shrub, usually grown as half-hardy annual. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Sow in boxes of sandy soil in greenhouse in temp. 60° during March. Prick out seedlings as soon as large enough to handle and gradually harden off for planting out in May.

SPECIES CULTIVATED: *T. rotundifolia* (syn. *T. speciosa*), 'Mexican Sunflower', orange-yellow, Aug. to Sept., 3 to 6 ft., Mexico and Cent. America.

Toadflax, see *Linaria*; **-flower**, see *Stapelia variegata* var. *clypeata*; **-Lily**, see *Tricyrtis*.

Tobacco Plant, see *Nicotiana*.

Todea, see *Leptopteris*.

Tolmiea—*Saxifragaceae*. Hardy perennial herb. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, shady beds or rock gardens. Plant, March.

PROPAGATION: By division of roots, March or April.

SPECIES CULTIVATED: *T. Menziesii*, green, April, 1 to 2 ft., N. America.

Tolpis (Yellow Garden Hawkweed)—*Compositae*. Hardy annuals. First introduced early seventeenth century.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Sow seeds $\frac{1}{16}$ in. deep in patches or lines where required to grow; thin seedlings when 2 to 3 in. high to 6 or 8 in. apart.

SPECIES CULTIVATED: *T. barbata* (syn. *Crepis barbata*), yellow, June, 1 to 2 ft., S. Europe.

Tomato, see *Lycopersicum esculentum*.

Toothache Tree, see *Zanthoxylum Clava-Herculis*.

Toothwort, see *Dentaria*.

Torenia—*Scrophulariaceae*. Greenhouse annuals. First introduced early nineteenth century.

CULTURE: Compost, loam, leaf-mould and sand. Position, small pots, with shoots trained to sticks, or in baskets suspended from roof. Sow seeds thinly in boxes filled with sandy soil in temp. 60° from Feb. to April. Prick out seedlings when large enough to handle into the pots or boxes in which they are to flower. Nip off point of main shoot when 3 in. long, also of side shoots when 2 in. long, to induce bushy growth. Water freely.

SPECIES CULTIVATED: *T. asiatica*, blue and yellow, summer, trailing, India; *atropurpurea*, purple, trailing, summer, Malay Peninsula; *flava* (syn. *T. Baillonii*), yellow and red-purple, summer, 1 ft., Trop. Asia; *Fournieri*, blue, purple, yellow, and black, summer, 1 ft., Cochinchina, and vars. *grandiflora* and *speciosa*; *travancoria*, blue-purple and yellow, trailing, summer, Madras.

Torreya—*Taxaceae*. Rather tender evergreen coniferous tree. First introduced mid-nineteenth century.

CULTURE: Soil, light, sandy loam. Position, sheltered, sunny, well-drained shrubberies. Plant, Sept., Oct., March or April.

PROPAGATION: As advised for *Taxus*.

SPECIES CULTIVATED: *T. californica*, 'Californian Nutmeg', 40 to 70 ft., California; *grandis*, 50 to 75 ft., China; *nucifera*, 50 to 80 ft., Japan; *taxifolia*, 'Stinking Cedar', 30 to 40 ft., W. Florida.

Totara Pine, see *Podocarpus Totara*.

Townsendia—*Compositae*. Hardy perennial American aster-like plants.

CULTURE: Any good loam, gritty and well drained. Position, full sun in the rock garden.

PROPAGATION: By seeds sown in early spring.

SPECIES CULTIVATED: *T. exscarpa* (syn. *T. Wilcoxiana*), purple, spring, 4 in., N. America.

Trachelium (Blue Throat-wort)—*Campanulaceae*. Half-hardy herbaceous perennial herbs. First introduced early seventeenth century.

CULTURE: Compost, two parts sandy loam, one part leaf-mould. Position, sunny rock gardens or dry walls or as cool greenhouse pot plant, and for summer bedding. Plant, March or April. Protect in severe weather by covering with dry fern fronds.

PROPAGATION: By seeds sown in above compost lightly covered with fine light soil, placing in temp. of 55° to 65°, spring, transplanting seedlings when large enough to handle, hardening in cold frame and planting out, May or June; cuttings of young shoots inserted in sandy soil under bell-glass in April or Sept. When grown as greenhouse pot plant or for bedding it is best raised annually from seed.

SPECIES CULTIVATED: *T. caeruleum*, blue, Aug., 2 ft., S. Europe, and var. *album*.

Trachelospermum—*Apocynaceae*. Rather tender evergreen climbing shrubs with fragrant flowers. First introduced mid-nineteenth century.

CULTURE: Soil, light loam, well drained, with some leaf-mould or peat. *T. jasminoides* as wall plant in cool greenhouse, or outside in S.W. districts. *T. asiaticum*, south or west walls in S. of England only.

PROPAGATION: By cuttings of half-ripened shoots in gentle bottom heat, July to Aug.

SPECIES CULTIVATED: *T. asiaticum* (syns. *T. crocostemon* and *T. divaricatum*), yellowish-white, July, glossy leaves, hardiest species, 12 to 15 ft., Japan and Korea; *jasminoides* (syn. *Rhynchospermum jasminoides*), 'Chinese Jasmine', white, very fragrant, July to Aug., leathery polished leaves, 10 to 12 ft., China, with vars. *variegatum*, foliage green, silver, and pink, and *Wilsonii*, narrow veined leaves.

Trachycarpus—*Palmae*. Greenhouse palm, hardy in southern parts of the kingdom. Leaves, fan-shaped and green. First introduced early nineteenth century.

CULTURE: Compost, two parts rich loam, one part decayed leaf-mould and sand. Position, well-drained pots in sunny greenhouse; sheltered place outdoors in the south. Pot, March. Temp., Sept. to March 40° to 50°, March to Sept. 50° to 60°. Water freely in spring and summer, moderately other times. Repotting only necessary every four or five years.

PROPAGATION: By seeds sown 1 in. deep in a temp. of 75° to 80°; also by suckers removed from base of parent.

SPECIES CULTIVATED: *T. Fortunei* (syn. *Chamaerops excelsa*), 'Windmill Palm', 25 to 30 ft., China.

Trachymene (Blue Lace Flower)—*Umbelliferae*. Half-hardy annual. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny. Sow in temp. of 55° in March, transplant seedlings 2 in. apart in pots or boxes, harden off in cold frame in April, and plant out in May.

SPECIES CULTIVATED: *T. caerulea* (syn. *Didiscus caerulea*), blue, summer, 8 in., Australia; *pilosa*, blue, summer, 6 in., Australia.

Tradescantia (Spiderwort)—*Commelinaceae*. Hardy herbaceous and stove perennials. First introduced early seventeenth century.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, partially shady or sunny borders or beds. Plant, Oct., March or April. Lift, divide and replant every three or four years. Excellent plants for town gardens.

CULTURE OF STOVE SPECIES: Compost, equal parts loam and leaf-mould with liberal addition of sand. Position, well-drained pots in warm greenhouse. Pot, March or April. Water freely March to Sept., moderately at other times. Temp.,

March to Sept. 65° to 75°, Sept. to March 55° to 60°. *T. fluminensis* common under benches in greenhouse.

PROPAGATION: Hardy species by division in spring; stove species by cuttings inserted in sandy soil under bell-glass in temp. 75°, April to Aug.

HARDY SPECIES CULTIVATED: *T. virginiana*, 'Flower of a Day', violet-purple, May to Sept., 1 to 2 ft., N. America, and several colour forms.

STOVE SPECIES CULTIVATED: *T. fluminensis*, 'Wandering Jew', prostrate, small leaves, S. America; *Reginae*, leaves purplish-crimson and silver above, purple beneath, 1 ft., Peru. See also *Rhoeo* and *Zebrina*.

Tragopogon—*Compositae*. Hardy biennial esculent-rooted vegetable with long, tapering, white roots.

CULTURE: Soil, rich, deeply trenched, free from stones. Position, sunny, open. Thin seedlings when 3 in. high to one in each group. Remove flower heads as soon as seen. Lift the roots in Nov., twist off their leaves, and store in layers with sand or soil between in cellar or outhouse until required for cooking. Roots left in the ground all winter will provide tender stems in the spring.

PROPAGATION: By seeds sown in groups of three or four, 12 in. apart, in drills $\frac{1}{2}$ in. deep and 18 in. apart in early April.

SPECIES CULTIVATED: *T. porrifolius*, 'Salsify', 'Vegetable Oyster', purple, May and June, 3 to 4 ft., S. Europe, N. America.

Trailing Arbutus, see *Epigaea repens*.

Transvaal Daisy, see *Gerbera Jamesonii*.

Trapa (Water Chestnut)—*Onagraceae*. Tender, annual, aquatic floating herbs with spiny edible fruit. First introduced late eighteenth century.

CULTURE: Soil, rich loamy. Position, sunny; shallow pots or tubs in cool greenhouse. Plant, April or May.

PROPAGATION: By seeds sown in loamy soil in water in temp. of 65° to 75° in spring.

SPECIES CULTIVATED: *T. bispinosa*, two to four spines, India, Ceylon; *natans* (syn. *T. bicornis*), 'Water Calthrops', 'Jesuit's Nut', reddish-white, summer, fruits edible, 2 in. in diameter, Europe; *verbanensis*, two-horned fruits, Italy.

Traveller's Joy, see *Clematis Vitalba*; **-Tree**, see *Ravenala madagascariensis*.

Treasure Flower, see *Gazania*.

Tree Celandine, see *Macleaya cordata*; **-Groundsel**, see *Baccharis halimifolia*;

-Heath, see *Erica arborea*; **-Lupin**, see *Lupinus arboreus*; **-Mallow**, see *Lavatera*;

-of-Heaven, see *Ailanthus altissima*; **-Onion**, see *Allium cepa* var. *viviparum*;

-Peony, see *Paeonia suffruticosa*; **-Poppy**, see *Romneya Coulteri*; **-Purslane**, see

Atriplex Halimus; **-Tomato**, see *Cyphomandra betacea*.

Trefoil, see *Trifolium*.

Trembling Fern, see *Pteris tremula*.

Trevesia—*Araliaceae*. Stove flowering shrub. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, large well-drained pots in warm greenhouse. Temp., March to Sept. 70° to 80°, Sept. to March 60° to 65°. Moist atmosphere essential during the summer months. Shade from strong sun. Water freely during growing season, moderately at other times. Pot, Feb. or March.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy soil under bell-glass in temp. 80°.

SPECIES CULTIVATED: *T. palmata* (syn. *Gastonia palmata*), yellowish-white, spring, to 20 ft., Himalaya; *sundaica* (syn. *Gastonia sundaica*), yellowish, spring, 15 ft., Java, Sumatra.

Trianea, see *Limnobium stoloniferum*.

Trias—*Orchidaceae*. An epiphytic genus closely allied to *Bulbophyllum*. Pseudo-bulbs small, clustered, one-leaved. Scapes from base short. Flowers attractive, solitary, freely produced in the species given.

CULTURE: As for *Bulbophyllum*, pans.

PROPAGATION: As for *Bulbophyllum*.

SPECIES CULTIVATED: A selection—*T. disciflora*, comparatively large, sepals yellow, thickly spotted red, petals small dark red, autumn, Siam; *picta*, yellowish, densely spotted red-purple, winter, spring, Burma.

Trichodiadema—*Aizoaceae*. Greenhouse succulent plants, formerly included in *Mesembryanthemum*.

CULTURE: As *Mesembryanthemum*.

PROPAGATION: As *Mesembryanthemum*.

SPECIES CULTIVATED: *T. barbatum* (syns. *Mesembryanthemum barbatum* and *stelligerum*), red, summer, Cape; *densum* (syns. *M. densum* and *M. barbatum* var. *densum*), carmine-violet, winter and early spring, S. Africa; *stellatum* (syn. *M. stellatum*), pale violet, winter and early spring, tufted 2 to 4 in., S. Africa.

Tricholaena—*Gramineae*. Half-hardy annual grass.

CULTURE: Soil, ordinary. Sow seeds $\frac{1}{4}$ in. deep and 1 in. apart in light, rich soil in well-drained pots or boxes in temp. 50° to 55°, Feb. or March; transfer seedlings when 2 in. high into boxes, then singly into $4\frac{1}{2}$ in. pots. Place in cold frame to harden in May and plant outdoors in June. May also be grown in pots in any loamy compost. Water freely.

SPECIES CULTIVATED: *T. rosea*, 'Ruby Grass', 3 to 4 ft., S. Africa.

Trichomanes—*Hymenophyllaceae*. Greenhouse filmy ferns. Fronds more or less divided, semi-transparent.

CULTURE: Compost, equal parts peat, loam, leaf-mould, charcoal, sandstone and silver sand. Position, moist, shady recesses of rockeries, under bell-glasses or in cases. Plant, March. Water freely March to Oct., moderately afterwards; syringing unsuitable. Damp atmosphere and shade most essential. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°. The Killarney fern is best grown in a cool house, frame in complete shade or wardian case. Provide plenty of sandstone for rhizomes to cling to. Constant moisture essential.

CULTURE IN CASES IN ROOMS: Compost, as above. Position, shady window. Plant, March. Top-dress with fresh compost annually in March. Water freely April to Sept., moderately afterwards. Ventilate case a few minutes daily. Species most suitable is *T. radicans*.

PROPAGATION: By spores sown on surface of sandy peat in shallow pan covered with bell-glass in temp. 65° to 75° at any time; by division at potting time.

SPECIES CULTIVATED: *T. alatum*, W. Indies; *auriculatum*, Trop. Asia; *capillaceum* (syn. *T. trichoides*), W. Indies; *Colensoi*, New Zealand; *exsectum*, Chile; *parvulum*, Tropics; *radicans*, 'Killarney Fern', 'Bristle Fern', Trop. and Temp. Regions; *reniforme*, New Zealand. Many other species are recorded, mainly belonging to hot swamps in tropical countries and scarcely known to cultivation.

Trichopilia—*Orchidaceae*. An epiphytic genus including some very handsome species. The single-leaved pseudo-bulbs usually set closely together; scapes from their base, usually arched, erect in the section *Pilumna*. The lip is the larger of the floral segments, the sepals and petals narrow, twisted in some; flowers are one or few.

CULTURE: Compost, two parts *osmunda* fibre or substitute, one part sphagnum moss, a very little loam fibre, with or without a few decayed oak or beech leaves, in pans which can be suspended. Pots for the erect spiked kinds, well drained. The *Pilumnas* can be grown in a cool or *Odontoglossum* house. Their winter temp. should be 50° to 55°. Species with drooped spikes should have a winter night temp. of 55° to 60°, higher in the summer. All with shading and a moist atmosphere and all exposed to light in autumn. Water freely when growing, but

infrequently in winter. Less atmospheric moisture is then needed—a position near the glass usually meets their requirements.

PROPAGATION: By division of the plants if and when large enough in spring.

SPECIES CULTIVATED: A selection—*T. Backhousiana*, near *T. fragrans*, but larger, leaves dimly green mottled, summer, Colombia; *brevis*, yellow, blotched chestnut, lip white with yellow and purple marks, summer, Peru; *coccinea*, brownish-green with a reddish stripe, lip crimson within, whitish externally, the front blotched rose-carmine, margin sometimes whitish, variable, early summer, Costa Rica, Guatemala; *crispa*, crimson with whitish margins, lip typical, early summer, Cent. America; *fragrans*, two to five white, disk yellow, autumn, winter, Colombia, var. *nobilis*, larger; *Galeottiana*, one to two pale yellow, lip with a red-spotted disk, summer, Mexico; *hymenantha*, four to twelve, rather small, whitish or yellowish, lip white, red-dotted, fringed, summer, Colombia; *laxa*, four to twelve, scapes arching, fragrant, dull rose, greenish, lip white, various, Colombia; *sanguinolenta*, one to three, olive-green, barred and spotted with chestnut, lip white, red-purple marked at base, various, Ecuador; *suavis*, two to five, fragrant, large, white or rose spotted, lip spotted and blotched rose-pink, disk orange spotted, variable, spring, summer, Cent. America, Costa Rica; *tortilis*, one to two, rose, margined yellow-green, lip white, spotted red-brown, various, Mexico.

Trichosanthes—*Cucurbitaceae*. Greenhouse annual climber. Fruit, very long, cucumber-like, twisted. First introduced early eighteenth century.

CULTURE: Compost, equal parts sandy loam, leaf-mould and fibrous peat. Position, well-drained pots, with shoots trained up roof of sunny greenhouse. Sow seeds singly, 1 in. deep, in 2 in. pots filled with above compost placed in temp. 65° to 75°, Feb. or March. Transplant seedlings when three leaves form into 4½ in. pots, and when well rooted into 8 in. size. Water freely; use tepid water only. Syringe daily May to Sept. Shade from mid-day sun. Apply weak stimulants twice a week May to Sept. Temp., 60° to 70°.

SPECIES CULTIVATED: *T. Anguina*, 'Serpent Gourd', 'Snake Gourd', white, summer, 10 to 15 ft., Trop. Asia.

Tricuspidaria, see *Crinodendron*.

Tricyrtis—*Liliaceae*. Half-hardy perennials. First introduced mid-nineteenth century.

GREENHOUSE CULTURE: Compost, equal parts of sandy loam, peat and silver sand. Position, well-drained pots in cool greenhouse or cold frame. Pot, Oct. to March. Plunge pots to rim in peat or cinder ashes in cool greenhouse or cold frame and give no water till growth commences, then apply moderately. When stems are 3 in. high place plants in light, airy position in greenhouse. No shade required. Apply weak stimulants once a week during flowering period. After flowering gradually withhold water till foliage turns yellow, then keep dry, and store pots away in cold frame or under staging in cool greenhouse until Feb. or March.

OUTDOOR CULTURE: Soil, peaty. Position, partially shady, sheltered, moist border. Plant rhizomes 2 in. below surface, Oct. to March. Protect in severe weather with covering of litter. Plants grown outdoors do not flower until autumn.

PROPAGATION: By offsets, removed at planting or potting time.

SPECIES CULTIVATED: *T. hirta*, 'Japanese Toad Lily', white and purple, autumn, 2 to 3 ft., Japan; *macropoda*, pale purple spotted blackish-purple, autumn, 2 to 3 ft., China and Japan, and var. *striata*, leaves striped white.

Trientalis—*Primulaceae*. Hardy herbaceous perennials.

CULTURE: Soil, ordinary light, rich. Position, shady borders, margins of rhododendron beds, rockeries or woodlands. Plant, Nov. to April.

PROPAGATION: By seeds sown in light, rich soil lightly covered with fine soil under hand-light in shady position outdoors in April; division of roots, Nov. or March.

SPECIES CULTIVATED: *T. borealis* (syn. *T. americana*), 'Starflower', white, May,

6 to 9 in., N. America; *europaea*, 'Chickweed Winter Green', pink and white, April to June, 6 to 8 in., N. Hemisphere.

Trifolium (Clover; Trefoil)—*Leguminosae*. Hardy perennials.

CULTURE: Soil, ordinary. Position, sunny borders or rock gardens. Plant, Oct. to April.

PROPAGATION: By division of plants, Oct. or March.

SPECIES CULTIVATED: *T. alpinum*, pale pink, May to July, 4 in., Europe; *badium*, golden yellow, summer, 6 in., Alps; *repens*, white, Europe (Br.), and vars. *album*, white, *purpureum*, leaves bronze-purple; *uniflorum*, deep pink, summer, 2 in., S. Europe.

Trigonella—*Leguminosae*. Hardy annuals. Leaves, feather-shaped. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, sunny borders. Sow seeds in April in patches lightly covered with fine soil. Thin seedlings when three leaves form to 6 in. apart.

SPECIES CULTIVATED: *T. caerulea*, blue, summer, 2 ft., E. Europe; *Foeniculum-Graecum*, 'Fenugreek', white, summer, 18 in., S. Europe.

Trillium—*Liliaceae*. Tuberous-rooted perennials. First introduced mid-eighteenth century.

CULTURE: Soil, sandy peat. Position, shady, moist, well-drained border. Plant, Aug. to Oct. Top-dress annually in March with layer of decayed leaves. Lift and replant only when absolutely necessary.

PROPAGATION: By seeds sown in shallow, well-drained boxes or pans filled with sandy peat, covering seeds lightly with fine soil, and placing in shady, cold frame; division of tuberous roots, Aug. to Nov.

SPECIES CULTIVATED: *T. cernuum*, white, April, 1 ft., N. America; *erectum*, purplish-maroon, April, 1 ft., N. America; *grandiflorum*, 'Wake Robin', 'American Wood Lily', white, May, 1 to 1½ ft., N. America; *nivale*, 'Snow Wood Lily', white, spring, 6 in., N. America; *ovatum*, white to pink, April, 1½ ft., N.W. America; *recurvatum*, maroon, April, 1 to 1½ ft., N. America; *rivale*, white and purple, March, 6 to 8 in., N. America; *sessile*, purple, March, 9 to 12 in., N. America; *undulatum* (syn. *T. erythrocarpum*), white and purple, May, 1 to 2 ft., N. America.

Triptilion—*Compositae*. Annual and perennial herbaceous plants. First introduced early nineteenth century.

CULTURE: Well-drained loamy soil. Position, cool situation in the rock garden.

PROPAGATION: By seeds sown in spring; careful division of old plants in spring or autumn.

SPECIES CULTIVATED: *T. spinosum*, blue, summer, 9 in., Chile.

Tristania—*Myrtaceae*. Greenhouse evergreen flowering shrubs. First introduced early nineteenth century.

CULTURE: Compost, equal parts loam, peat and sand. Position, well-drained pots or borders in heated greenhouse. Pot, March or April. Water freely during growing season, moderately at other times. Temp., March to Sept. 55° to 65°, Sept. to March 45° to 55°.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy soil under bell-glass in gentle bottom heat during July or Aug.

SPECIES CULTIVATED: *T. conferta*, 'Brisbane Box', yellow, July to Sept., 20 to 30 ft., Australia; *neriifolia*, yellow, July to Sept., 15 to 20 ft., Australia; *suaveolens*, yellow, Aug., 10 to 15 ft., Australia.

Trithrinax—*Palmae*. Stove hermaphrodite fan palms. First introduced mid-nineteenth century.

CULTURE: Compost, two parts loam, one part peat, and little sand. Position, well-drained pots in moist part of stove. Water copiously April to Oct., moderately afterwards. Syringe daily April to Sept. Moist atmosphere highly essential. Shade from sun. Temp., March to Oct. 70° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By seeds soaked for a few hours in tepid water and then sown $\frac{1}{2}$ in. deep in sandy loam in temp. of 75° to 85° any time.

SPECIES CULTIVATED: *T. acanthocoma*, 10 to 15 ft., Brazil; *brasiliensis*, 10 to 15 ft., Brazil.

Tritelia, see Brodiaea.

Tritoma, see Kniphofia.

Tritonia—*Iridaceae*. Hardy or half-hardy cormous plants. The common Montbretia of gardens is *Crocasmia crocosmaeflora* although often known as Tritonia.

CULTURE: Soil, sandy loam. Position, sunny well-drained borders. Plant 3 in. deep and 2 in. apart in groups during March or April. Water occasionally in very dry weather. Stimulants can be applied during flowering period. Lift plants in Oct. and place in shallow boxes filled with dry soil and keep in unheated frame or greenhouse until planting time. Practically no water required until growth commences in Feb. In sheltered gardens corms may be left in ground with covering of dry litter during winter.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed cow manure. Place five bulbs 3 in. deep in $4\frac{1}{2}$ in. pots in Nov. and cover with peat in cold frame or under stage in cool greenhouse until growth begins. Water moderately from time plants begin to grow until flowers fade, then occasionally till plant dies down and keep dry till Jan. Temp., Sept. to March 40° to 50° , March to Sept. 50° to 60° .

PROPAGATION: By offsets.

SPECIES CULTIVATED: *T. crocata*, tawny red, summer, 2 ft., S. Africa; *flavida*, yellow, summer, 2 ft., S. Africa; *rosea*, bright red spotted yellow at base, summer, 3 ft., S. Africa.

Trochodendron—*Trochodendraceae*. Hardy evergreen flowering tree with handsome foliage and green flowers.

CULTURE: Soil, moist, peaty loam. Position, large shrubberies, or as specimens on lawns. Plant, Sept. to Oct. or April to May.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy soil under bell-glass in slight bottom heat during July or Aug.

SPECIES CULTIVATED: *T. aralioides*, bright green, April to June, 15 to 30 ft., Japan and Korea.

Trollius (Globe Flower)—*Ranunculaceae*. Hardy herbaceous perennials.

CULTURE: Soil, deep, moist ordinary, or preferably loam. Position, partially shady borders or margins of ponds or streams. Plant, Oct. or April. Water freely in dry weather. Lift, divide and replant every three or four years.

PROPAGATION: By seeds sown in moist, loamy soil in shady position outdoors in Sept. or April; division of roots, Oct. or April.

SPECIES CULTIVATED: *T. asiaticus*, orange, May, 18 in., Siberia; *caucasicus*, yellow, May to June, 2 to 3 ft., W. Asia; *chinensis*, yellow, May to June, 2 to 3 ft., N. China; *europaeus*, lemon-yellow, May to June, $1\frac{1}{2}$ to 2 ft., Europe; *japonicus*, yellow, May to June, 6 to 8 in., Japan, and var. *flore-pleno*, double; *Ledebouri*, yellow, May to June, $1\frac{1}{2}$ to 2 ft., Siberia; *pumilus*, yellow, May to June, 8 to 12 in., Himalaya, and var. *yunnanensis*, taller.

Tropaeolum—*Tropaeolaceae*. Greenhouse or hardy perennial dwarf or climbing herbs. Several treated as hardy annuals.

CULTURE OF CANARY CREEPER: Soil, good ordinary soil or sandy loam. Position, against sunny or shady wall, fence, arbour or trellis; does well in a north aspect. Sow seeds $\frac{1}{8}$ in. deep in light soil in temp. 50° in March, harden off seedlings in cold frame in April, and plant outdoors in May; or $\frac{1}{4}$ in. deep outdoors in April where required to grow. Water freely in dry weather.

CULTURE OF NASTURTIUM: Soil, ordinary. Position, sunny. Sow seed 1 in. deep in April where plants are required to grow. Remove seed pods as they form to ensure free flowering.

POT CULTURE: Sow seeds $\frac{1}{2}$ in. deep and 2 in. apart in 5 in. pots filled with a compost of two parts good soil and one part decayed manure in April. Place pots in window or cold frame. Water moderately at first, freely when in full growth. Apply stimulants occasionally when in flower. Double vars. propagated by cuttings in temp. 55° in spring. Plant outdoors in May or June. May be grown in pots in a compost of four parts loam, one part leaf-mould, and a little sand. Pot in March or April. Water freely in summer, moderately other times. Temp., Oct. to March 40° to 50°, March to June 55° to 65°.

CULTURE OF *T. PELTOPHORUM*: Sow seeds in light soil in temp. 50° in March, harden seedlings off in cold frame in April, and plant out in June in sunny position against walls, fences, arbours, or in borders, placing tree branches to support the shoots; or outdoors $\frac{1}{2}$ in. deep in April where required to grow.

INDOOR CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed manure, and half a part sand. Position, well-drained pots or beds, training shoots up rafters. Water moderately Sept. to April, freely afterwards. Temp., Sept. to March 50°, March to Sept. 60°.

CULTURE OF GREENHOUSE TUBEROUS-ROOTED SPECIES: Compost, four parts turfy loam, one part leaf-mould, peat and silver sand. Position, well-drained pots in light, airy greenhouse. Pot, Aug. to Nov. Place one tuber only in a pot and bury this about 1 in. Water very little till plants grow freely, then give an abundant supply. Withhold water entirely when foliage turns yellow and until growth recommences. Apply stimulants occasionally when plants are in flower. Train shoots to wire trellis fixed in pots or up rafters. Temp., Nov. to Feb. 40° to 50°, Feb. to June 55° to 65°. After growth ceases store pots in cool place till potting time.

CULTURE OF HARDY SPECIES: Soil, light, sandy loam for *T. pentaphyllum*; ordinary soil for *T. polyphyllum*; equal parts loam, peat, leaf-mould and sand for *T. speciosum*; poorish soil for *T. tuberosum*. Position, south wall or fence for *T. pentaphyllum*; sunny bank for *T. polyphyllum*; shaded wall or hedge facing north for *T. speciosum*; sunny border for *T. tuberosum*. Plant *T. tuberosum* in March or April; *T. polyphyllum*, Aug. to Nov.; *T. speciosum* and *T. pentaphyllum*, Oct. or March. Water freely in dry weather. Mulch with decayed manure in Oct. Lift tubers of *T. tuberosum* in Oct. and store in sand in frost-proof place till March; leave others undisturbed.

PROPAGATION: *T. peltophorum* by cuttings of shoots, 2 to 3 in. long, inserted in sandy soil in temp. 50° in spring. Greenhouse tuberous-rooted species by seeds sown in light, sandy soil in temp. 50° in spring; cuttings of shoots inserted in sandy soil and similar temp. in spring or summer. Hardy species by seeds sown in loam, leaf-mould and sand in cold frame in April; *T. majus* outdoors in April; division of roots at planting time.

ANNUAL SPECIES CULTIVATED: *T. majus*, 'Tall Nasturtium', orange and brown, summer, 5 to 10 ft., Peru, and var. *nanum*, 'Tom Thumb Nasturtium'; *peregrinum* (syn. *T. canariense*), 'Canary Creeper', yellow, summer, 3 to 10 ft., Peru. All these are strictly perennials but are best grown as annuals.

GREENHOUSE SPECIES: *T. azureum*, blue, green, and white, Oct., 3 to 6 ft., tuberous-rooted, Chile; *minus*, yellow and red, summer, trailing, S. America; *peltophorum* (syn. *T. Lobbianum*), orange-scarlet, summer and winter, 6 to 10 ft., S. America; *pentaphyllum*, vermilion and purple, summer, climbing, tuberous-rooted, Argentine; *tricolor*, vermilion, purple and yellow, summer, climbing, Chile.

HARDY PERENNIAL SPECIES CULTIVATED: *T. polyphyllum*, yellow, June, trailing, Chile; *speciosum*, 'Flame Flower', crimson, summer, 10 ft., Chile; *tuberosum*, yellow and red, Sept., climbing, tuberous-rooted, Peru.

Trumpet Creeper, see *Campsis*; **-flower**, see *Datura*, *Bignonia capreolata*, and *Clytostoma*.

Tsuga (Hemlock)—*Pinaceae*. Hardy evergreen coniferous trees with handsome and elegant habit of growth. First introduced early eighteenth century.

CULTURE: Soil, deep, rich loam. Position, elevated, well-drained sites in parks or pleasure grounds, succeeding best in areas of heavy rainfall. Plant in autumn.

PROPAGATION: By seeds sown in sandy soil outdoors in April or in pans in gentle warmth in March; cuttings of ripened shoots inserted in sandy soil in cold frames during Sept. or Oct.

SPECIES CULTIVATED: *T. canadensis* (syn. *Abies canadensis*), 'Canadian' or 'Common Hemlock', the most satisfactory species, grows on chalk, 70 to 90 ft., Eastern N. America, with vars. *albo-spica*, young shoots tipped white, and *pendula*, beautiful weeping form, wider than high; *caroliniana*, 'Carolina Hemlock', compact habit, 40 to 60 ft., S.E. United States; *chinensis*, slow growing, elegant, to 150 ft., W. China; *diversifolia*, 'Japanese Hemlock', slow growing, pyramidal, to 70 ft., Japan; *heterophylla* (syn. *T. Albertiana*), 100 to 200 ft., Western N. America; *Mertensiana*, 'Mountain Hemlock', bluish-green leaves, purple cones, 70 to 110 ft., S. Alaska to California; *Sieboldii*, slow growing graceful tree, to 100 ft., Japan. (Note: The heights here given refer to trees in their native land, but some species, notably *T. chinensis*, *diversifolia* and *Sieboldii*, are as yet slow growing yet are singularly graceful small trees in this country.)

Tuberose, see *Polianthes tuberosa*.

Tulipa (Tulip)—*Liliaceae*. Hardy bulbous-rooted plants. First introduced late sixteenth century.

R.H.S. CLASSIFICATION: Early-flowering—(1) Duc van Thol, very early, rarely exceeding 6 in. in height; (2) Single Early, March, April; (3) Double Early, March, April; (4) Mendel, mid-season, single tall tulips of medium build; (5) Triumph, mid-season, single tall tulips of stouter build than Mendel and not so tall as Darwin. May-flowering—(6) Cottage, all tulips, including lily-flowered, which do not fall within the other classes; (7) Dutch Breeders, flower oval or cupped, brown, purple or red, but sometimes bronze, base white or yellow, but generally stained blue or green to blue-black; (8) English Breeders, flowers forming one-third to a half of a hollow ball when full expanded, base always white or yellow without trace of other colour; (9) Darwin, lower portion of flower usually rectangular in outline, segments of good substance, stems tall and strong; (10) Broken Dutch Breeders, as (7), but flowers striped or flaked; (11) Broken English Breeders, as (8), but flowers striped or flaked; (12) Rembrandt, as (9), but flowers striped or flaked; (13) Broken Cottage, as (6), but flowers striped or flaked; (14) Parrot, vars. with lacinate segments; (15) Late Double; (16) Species and first crosses between species.

CULTURE: Soil, ordinary light, enriched with manure or compost. Position, sunny beds, borders, rockeries or naturalised in grass. Plant 4 in. deep, 6 in. apart, Sept. to Nov., and mulch surface of soil with compost or manure. Bulbs grown in beds can be lifted directly after flowering and replanted at once into reserve border to finish growth, or left till July and then lifted, dried and stored away till planting time. Bulbs may be left in ground if desired, lifted, divided and replanted every three years.

POT CULTURE: Compost, two parts loam, one part rotted manure and little sand. Pot, Sept. to Nov., placing three bulbs in a 5 in. or four in a 6 in. pot and burying bulbs just below surface. Pot firmly. Place pots in cold frame and cover with cinders or peat for at least eight weeks. Remove to window, frame or greenhouse when growth begins and water freely. Temp. for forcing, 55° to 65°.

CULTURE FOR EXHIBITION: Compost, four parts good turfy loam, one part leaf-mould, one part decayed manure and one part sand mixed together and allowed to remain in heap for a year. Position, well-drained sunny bed containing about 18 in. of above compost. Plant bulbs 3 to 4 in. deep and 6 in. apart, end of Oct. or beginning of Nov. Surround each bulb with sand. Protect blooms with canvas awning. Lift bulbs when leaves turn brown. Store in cool shed to dry, after which remove loose skins and place in drawers till planting time.

PROPAGATION: By seeds sown in Feb. in light sandy soil in cold frame, transplanting following year to bed of rich soil outdoors; offsets removed from parent

bulb and planted 3 in. deep in light rich soil in sunny position outdoors in Nov. Seedling bulbs flower when four to six years old, offsets when three to four years old.

SPECIES CULTIVATED: *T. acuminata*, 'Turkish Tulip', yellow and red, May, 1 to 1½ ft., Turkey; *australis* (syn. *T. Celsiana*), yellow and red, April, 1½ ft., France to Algeria; *Batalinii*, yellow, May, 5 to 6 in., Asia Minor; *biflora*, cream and purplish-rose, March, 3 to 4 in., Caucasus; *Billettiana*, yellow, May, 2 ft., Italy; *chrysantha*, yellow and cherry red, April, 6 to 8 in., Persia; *Clusiana*, white, red, and black, April, 12 to 18 in., Portugal to Persia; *Didieri*, crimson and purplish-black, 8 to 12 in., S. Europe; *Eichleri*, scarlet and blue-black, April, 9 to 12 in., S.W. Asia; *elegans*, red and yellow, May, 1 ft., hybrid; *Fosteriana*, scarlet, yellow, and black, April, 12 to 18 in., Turkistan; *Gesneriana*, 'Common Tulip', scarlet and black, May, fragrant, 2 ft., Armenia, Persia, and vars. *ixioides*, canary-yellow with black centre, *lutea*, yellow, *rosea*, rose, and *spathulata*, larger, red with purple blotch; *Gregii*, scarlet, yellow, and black, April, 6 to 9 in., Turkistan; *Hageri*, copper-red and olive, April, 4 to 6 in., Greece; *ingens*, vermilion and purplish-black, April, 10 to 12 in., Bokhara; *Kaufmanniana*, white, red, and yellow, March, 6 in., Turkistan; *Kolpakowskiana*, yellow and rose, April, 5 to 6 in., Turkistan; *linifolia*, crimson and blue-purple, May, 6 to 8 in., Bokhara; *montana*, crimson and black, June to July, 6 to 8 in., Persia; *Oculus-solis*, red, yellow, and black, April, 18 in., S. Europe; *Orphanidea*, dark orange, April, 8 to 10 in., Greece; *patens* (syn. *T. persica*), yellow, tinged green and red, May, 6 to 9 in., Siberia; *polychroma*, white, yellow, and grey, April, 4 in., Persia; *praecox*, red and black, April, 1½ ft., S. Europe; *praestans*, light scarlet, April, 10 to 12 in., Bokhara; *primulina*, yellow and red, spring, 6 in., Algeria; *pulchella*, mauve-red and yellow, March, 4 to 6 in., S.W. Asia; *saxatilis*, lilac and yellow, May, 9 to 12 in., Crete; *Sprengeri*, orange-scarlet and buff, June, 10 to 12 in., Armenia; *suaveolens*, 'Duc van Thol Tulip', scarlet and yellow, fragrant, May, 6 in., S. Europe; *tarda* (syn. *T. dasystemon* hort.), white with yellow at base, May, 3 to 6 in., Turkistan; *Tubergeniana*, vermilion and purplish-black, May, 8 to 10 in., Bokhara; *violacea*, mauve, spring, 6 in., N. Persia.

Tulip Tree, see *Liriodendron Tulipifera*.

Tunica—*Caryophyllaceae*. Herbaceous wiry-stemmed perennials.

CULTURE: Soil, ordinary light. Position, sunny well-drained rock gardens or dry walls. Plant, Oct. or March.

PROPAGATION: By seed sown in sandy soil in boxes in cold frame during March; division at the same time.

SPECIES CULTIVATED: *T. Saxifraga*, pink, June to Sept., 6 in., Europe, and vars, *alba*, white, and *flore-pleno*, double.

Tupelo, see *Nyssa*.

Turfing Daisy, see *Matricaria Tchihatchewii*.

Turkey Beard, see *Xerophyllum*.

Turkish Hazelnut, see *Corylus Colurna*.

Turk's Cap Cactus, see *Melocactus communis*.

Turmeric, see *Curcuma longa*.

Turnip, see *Brassica Rapa*.

Turtlehead, see *Chelone*.

Tutsan, see *Hypericum Androsaemum*.

Twin-flower, see *Linnaea borealis*; **-leaf**, see *Jeffersonia diphylla*.

Typha (Cat-tail; Reed Mace)—*Typhaceae*. Hardy aquatic perennials.

CULTURE: Soil, ordinary. Position, margins of shallow rivers or ponds. They may be grown in 1 to 6 in. of water. Plant, Oct. or March.

PROPAGATION: By division or seed.

SPECIES CULTIVATED: *T. angustifolia*, brown, July, 8 to 10 ft., Europe; *latifolia*,

brown, July, 6 to 8 ft., N. Temp. Region (Br.); *Laxmannii* (syn. *T. stenophylla*), brown, July, 2 to 4 ft., S.E. Europe to China; *minima*, brown, July, 12 to 18 in., E. Europe.

Typhonodorum—*Araceae*. Stove plant with ornamental arrow-like leaves and bright yellow arum-like flowers; very striking.

CULTURE: Soil, rich loam enriched with rotted manure. Position, tropical tank in warm greenhouse. Temp., Oct. to March 65° to 70°, March to Oct. 70° to 85°.

PROPAGATION: By division; seed sown in shallow pans in warm house.

SPECIES CULTIVATED: *T. Lindleyanum*, yellow spathe 1½ to 2 ft. long, Aug., 4 to 10 ft., Trop. Africa, Madagascar.

Ulex (Furze; Gorse; Whin)—*Leguminosae*. Very spiny hardy evergreen shrubs.

CULTURE: Soil, poor and dry. Position, full sun, hot banks or rockeries. Overgrown or leggy plants may be hard cut in spring.

PROPAGATION: By seeds sown ¼ in. deep in light soil outdoors in April for common gorse, preferably where the plants are to grow as all forms transplant badly; cuttings inserted in sandy soil in cold frame during Aug. and kept close for the double form, which does not set seed. Grow in pots until planted out.

SPECIES CULTIVATED: *U. europaeus* 'Common Gorse', gold, all the year round, 3 to 6 ft., Europe, including British Isles, of little garden value, but var. *plenus*, double-flowered, slow growing, compact, most ornamental shrub for dry places, fragrant; *Gallii*, yellow, Aug. to Oct., 2 ft., W. Europe, including Britain; *nanus*, 'Dwarf Gorse', yellow, September, W. Europe. (Note: All three species abundant in heath land and waste areas in Britain.)

Ulmus (Elm)—*Ulmaceae*. Hardy deciduous trees. Flowers insignificant, appearing before the leaves. Some species are indigenous.

CULTURE: Soil, ordinary for common species, deep rich loam with gravelly subsoil for Wych-Elm, moist loam for American Elm. Position, open and sunny woodlands, parks or shrubberies for all species and vars. Not very suitable as garden trees owing to their extensive root systems which impoverish the soil. Large specimens of Common Elm are liable to shed branches without warning. Plant, Oct. to Feb. Timber fine, hard grain and brown in colour, used for making coffins, carts and wagons, furniture, etc. Average weight of timber per cubic foot, 43 lb. Average life of tree, 400 to 500 years. Will thrive to an altitude of 1500 ft.

PROPAGATION: By suckers removed and planted Oct. to Nov.; layering shoots in Sept. or Oct.; budding choice kinds on common species and choice variegated kinds on *U. glabra* in July, or by grafting similarly in March; seeds gathered as soon as ripe and sown in light soil in shade outdoors.

SPECIES CULTIVATED: *U. americana*, 'American' or 'White Elm', graceful habit, 100 to 120 ft., Central N. America; *carpinifolia* (syn. *U. nitens*), 'Smooth-leaved Elm', deeply fissured bark, to 90 ft., Europe, W. Asia, and vars. *pendula*, weeping, *suberosa*, cork-barked, *variegata*, white markings at margins of leaves, *Webbiana*, pyramidal habit; *crassifolia*, 'Cedar Elm', small thick leaves, slow growing, to 80 ft., S. United States; *fulva*, 'Slippery Elm', large leaves, 60 to 70 ft., Cent. and Eastern N. America; *glabra* (syn. *U. montana*), 'Wych-Elm', does not sucker, large rough leaves, 100 to 125 ft., N. Europe, and vars. *Camperdownii*, weeping, *crispa*, narrow leaves, slow growing, *fastigiata*, 'Exeter Elm', upright growth, *lutescens*, leaves yellow, *pendula*, low growing, weeping, good lawn specimen, *purpurea*, leaves purple; *hollandica major* (syn. *U. major*), 'Dutch Elm', quick growing, to 120 ft., hybrid, var. *vegeta*, vigorous tree with ascending branches; *procera* (syn. *U. campestris*), 'English Elm', common in S. England, rarely sets seed, 100 to 150 ft., England and W. Europe, and vars. *argenteo-variegata*, leaves spotted white, *aurea*, yellow leaves, *australis*, pyramidal habit, thick leaves, *Berardii*, small tree, leaves coarsely toothed, *Vanhouttei*, yellow leaved; *Plotii*, 'Pilot Elm', immense straight trunk, to 90 ft., Europe; *pumila*, dwarf, 10 to 30 ft., E. Siberia, N. China.

Umbellularia—*Lauraceae*. Slightly tender evergreen flowering tree; purple pear-shaped fruits in favoured localities. First introduced early nineteenth century.

CULTURE: Soil, loamy, well drained. Position, against sheltered walls or in the open in mild districts. Plant, Sept. to Oct. or April to May.

PROPAGATION: By seeds sown in pans of sandy soil in cool greenhouse during Feb. or March; layering in spring.

SPECIES CULTIVATED: *U. californica* (syn. *Oreodaphne californica*), yellowish-green, April, 20 to 80 ft., California and Oregon.

Umbilicus—*Crassulaceae*. Succulent perennial plants, sometimes included in the genus *Cotyledon*.

CULTURE: Soil, ordinary. Position, sunny beds or rock gardens. Plant, Oct. or March.

SPECIES CULTIVATED: *U. pendulinus* (syn. *Cotyledon Umbilicus*), 'Navelwort', 'Pennywort', greenish-yellow, June to July, 8 to 12 in., Britain.

Umbrella Leaf, see *Diphyllia cymosa*; **-Pine**, see *Sciadopitys verticillata*; **-Plant**, see *Cyperus alternifolius*; **-Tree**, see *Magnolia tripetala*.

Unicorn Plant, see *Proboscidea*.

Uniola—*Gramineae*. Hardy perennial grass. Inflorescence borne in large loose panicles, July and Aug.

CULTURE: Soil, ordinary. Plant, March or April. Position, open sunny borders. Gather inflorescence in Aug. and dry for winter use.

PROPAGATION: By seeds sown in light rich soil outdoors in April; division of roots in March.

SPECIES CULTIVATED: *U. latifolia*, 'Sea Oat', 5 ft., N. America.

Urceolina—*Amaryllidaceae*. Greenhouse deciduous bulbous plants. First introduced early nineteenth century.

CULTURE: Compost, two parts turfy loam, one part river sand and a few crushed bones. Position, well-drained pots in light part of house. Pot, Feb., burying bulb about two-thirds of its depth. Water freely from time growth begins (about Feb.) until Sept., when keep quite dry. Apply liquid manure when flower spike shows. Top-dress annually and repot every three or four years only. Temp., Feb. to Sept. 55° to 65°, Sept. to Feb. 40° to 50°.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in well-drained pots of sandy loam in temp. 65° to 70° in March, placing seedlings singly in 2 in. pots, and keeping them moderately moist all the year round for three years; by offsets, treated as old bulbs.

SPECIES CULTIVATED: *U. miniata*, scarlet, Sept., 1 ft., Peru; *pendula* (syn. *U. aurea*), 'Golden Urn Flower', 'Drooping Urn Flower', yellow, summer, 1 ft., Peru.

Urginea—*Liliaceae*. Half-hardy bulbous plant. Source of the 'squill' of commerce. First introduced early nineteenth century.

CULTURE: Soil, light loam, leaf-mould and sand. Position, well-drained pots in unheated greenhouse. Pot, Oct. to Nov. Water freely during the growing season.

PROPAGATION: By offsets, removed at potting time.

SPECIES CULTIVATED: *U. maritima* (syn. *U. Scilla*), whitish, late summer, to 3 ft., S. Europe and S. Africa.

Ursinia—*Compositae*. Half-hardy annuals. First introduced mid-eighteenth century.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Sow seeds, Feb. or March, in ordinary light soil in pots, pans or boxes in temp. 55° to 65° and transplant seedlings when 1 in. high to 3 in. apart in shallow boxes; place in cold frame in April; harden off and plant outdoors, May or June. Also sow seeds in open ground in April where required to grow and thin seedlings to 4 or 6 in. apart when 1 to 6 in. high.

SPECIES CULTIVATED: *U. anethoides*, orange-yellow, summer, 1 ft., S. Africa; *anthemoides*, yellow and purple, summer, 1 ft., S. Africa; *pulchra* (syn. *Sphenogyna*

speciosa), yellow and brown, summer, 1 to 2 ft., S. Africa; *pygmaea*, orange-yellow, summer, 4 to 6 in., S. Africa.

Utricularia (Bladderwort)—*Lentibulariaceae*. Hardy aquatic carnivorous herb. CULTURE: Soil unnecessary. Position, ponds or tubs in about 2 ft. of water. Plant, April to May.

PROPAGATION: By division at planting time.

SPECIES CULTIVATED: *U. vulgaris*, yellow, floating, Aug., Europe (Br.).

Uvularia (Bellwort)—*Liliaceae*. Hardy perennial plants. First introduced early eighteenth century.

CULTURE: Soil, moist peat. Position, partially shaded border. Plant, Oct. and Nov.

PROPAGATION: By division of roots in Oct.

SPECIES CULTIVATED: *U. grandiflora*, yellow, May, 1 ft., N. America; *perfoliata*, yellow, May, 1 ft., N. America; *sessilifolia* (syn. *Oakesia sessilifolia*), greenish-yellow, May, 1 ft., N. America.

Vaccinium—*Ericaceae*. Hardy deciduous and evergreen flowering and berry-bearing shrubs. Edible red or bluish-black berries in Aug. to Oct.

CULTURE: Soil, boggy peat, lime-free. Position, moist rock garden or shrubbery. Plant, Oct. to March or April.

PROPAGATION: By seeds, in moist sandy peat in temp. 55° to 65° in spring, transplanting seedlings outdoors in summer; cuttings of semi-matured shoots in sandy, moist peat under hand-light in shade in summer; layering in autumn; division, Sept. to March.

DECIDUOUS SPECIES CULTIVATED: *V. angustifolium*, greenish-white, April to May, 1 ft., N. America, var. *laevifolium* (syn. *V. pensylvanicum*), grown for fruit; *canadense*, white, tinged red, May, 1 to 2 ft., Eastern N. America; *caespitosum*, 'Dwarf Bilberry', white or pink, May, 1 ft., black berries, N. America; *corymbosum*, 'American Blueberry', pinkish, May, 4 to 12 ft., Eastern N. America; *erythrocarpum*, red, May, 3 to 6 ft., South-east U.S.A.; *hirsutum*, white, tinged pink, May, 3 ft., N. Carolina, etc.; *Myrtillus*, 'Bilberry' or 'Whortleberry', pale pink, May, 6 to 18 in., Europe (Br.), N. Asia; *parvifolium*, pinkish-white, 2 to 10 ft., Western N. America.

EVERGREEN SPECIES CULTIVATED: *V. macrocarpum* (syn. *Oxycoccus macrocarpus*), 'Large American Cranberry', pink, June to Aug., creeping, N. America; *ovatum*, white or pink, June to July, 10 to 12 ft., Western N. America; *Oxycoccus* (syn. *Oxycoccus palustris*), 'European Cranberry', pink, May to July, red berries, N. Hemisphere (Br.); *Vitis-idaea*, 'Cowberry', pink or white, May to June, 6 to 8 in., N. Hemisphere (Br.).

Valerian, see *Centranthus*.

Valeriana—*Valerianaceae*. Hardy perennial herbs.

CULTURE: Soil, ordinary. Position, sunny borders for *V. Phu*; sunny rock gardens or the front of borders for other species. Plant, Sept. to April. Cut down flowering stems of *V. Phu* in Oct. and pick off flower buds as they form.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in light soil in sunny position outdoors in April; division of roots in March or April.

SPECIES CULTIVATED: *V. arizonica*, pink, March, 2 to 3 in., Arizona; *asarifolia*, red, June, 6 to 9 in., Crete; *celtica*, 'Nard' or 'Spike', brownish-yellow, June, 4 to 5 in., Europe; *montana*, rose pink, summer, 6 in., Europe; *Phu*, 'Cretan Spikenard', white, Aug., 2 ft., Caucasus, var. *aurea*, young shoots golden yellow; *supina*, rose pink, spring and early summer, 3 to 4 in., Europe.

Valerianella—*Valerianaceae*. Hardy annual salad vegetables. Leaves largely used in winter and spring for salads.

CULTURE: Soil, ordinary. Position, sunny, dryish border. Sow seeds in drills, 1 in. deep and 6 in. apart, fortnightly during Aug. and Sept. Thin seedlings when

three leaves form to 6 in. apart in the row. Gather leaves either separately or by cutting off the entire plant. Matures in six to eight weeks.

SPECIES CULTIVATED: *V. eriocarpa*, 'Italian Corn Salad', light blue, April, leaves to 5 in. long, S. Europe; *Locusta* (syn. *V. olitoria*), 'Corn Salad' or 'Lamb's Lettuce', blue, April, leaves to 3 in., Europe (Br.).

Vallisneria—*Hydrocharitaceae*. Half-hardy aquatic herb. In great demand by aquarists. First introduced early nineteenth century.

CULTURE: Soil, rich loam. Position, deep tubs, cisterns or aquariums. Plant in small pot or in heap of compost in bottom of tank, etc., March or April. Temp., Sept. to March 45° to 50°, March to Sept. 60° to 75°.

PROPAGATION: By seeds sown in moist loam in water, spring; division, spring.

SPECIES CULTIVATED: *V. spiralis*, 'Eel Grass', 'Tape Grass', minute, white, July, long narrow leaves, S. Europe, N. America, and vars. *gigantea*, and *torta*, with twisted foliage.

Vallota—*Amaryllidaceae*. Greenhouse evergreen bulbous plants. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts good fibrous loam, leaf-mould and sand. Position, well-drained pots in light, sunny greenhouse or window. Pot imported bulbs, Oct., Nov., March or April. Repot established plants in June or July. Place bulbs with points just below the surface; pot firmly. Water moderately Sept. to March, freely March to June, keep nearly dry June to Sept. Apply stimulants once or twice a week March to June. Established plants do best placed in sunny, cold frame, or on layer of cinder ashes or slate, tile or board in open-air, May till flowering period. Repotting necessary every three or four years only. Temp., Sept. to March 40° to 50°, March to June 55° to 65°.

OUTDOOR CULTURE: Soil, light, sandy loam. Position, warm, well-drained border at foot of south wall. Plant bulbs, Oct., Nov., March or April, 6 in. deep and surround with sand. Press soil firmly round bulbs. Protect in winter with a covering of dry litter or fern fronds.

PROPAGATION: By offsets, removed at potting or planting time.

SPECIES CULTIVATED: *V. speciosa* (syns. *V. purpurea* and *Amaryllis purpurea*), 'Scarborough Lily', red, Aug., 2 to 3 ft., S. Africa, var. *alba*, white.

Vancouveria—*Berberidaceae*. Hardy perennial with creeping rootstocks. First introduced mid-nineteenth century.

CULTURE: Soil, rich loam with leaf-mould or peat. Position, cool, shady beds or borders. Plant, autumn or spring.

PROPAGATION: By division in autumn.

SPECIES CULTIVATED: *V. chrysantha*, yellow, June, 9 in., Oregon; *hexandra*, white, spring, 12 to 18 in., N. America; *planipetala* (syn. *V. parviflora*), white, June, 12 in., California, Oregon.

Vanda—*Orchidaceae*. A large, important, epiphytic genus, widely distributed in the East; numerous species with beautiful flowers; variation is present in habit and flowers; many have tall stems clothed with leaves in two opposite rows. Spikes often long, lateral. As in *Acrides*, stem roots are emitted from many. Usually the floral segments are spreading and a twist is often noticeable in the petal bases, bringing their reverse surfaces into view; lip usually of much greater substance, smaller, the mid-lobes often ridged. See *Vandopsis*.

CULTURE: Compost, half part osmunda fibre or substitute, half part sphagnum moss, with a liberal addition of broken crocks, the larger the plant the larger the pieces, placed vertically in the compost; pieces of charcoal may be added and the pots filled to at least one-third with drainage. The wide distribution demands difference in their treatment. *V. Watsonii* should be grown with *Odontoglossums*, *V. Amesiana*, *Kimballiana*, *caerulea*, a winter temp. of 50° to 55° and very infrequent waterings if any. *V. teres* should also have a very decided rest in winter, but enjoys a moist tropical atmosphere when growing, as do the great majority. The

Far Eastern species should have a winter temp. of 65° to 70°; for some from Borneo and the Philippines, 70° is preferable. All require liberal watering when growing and the syringe may be freely used. In winter discretion must be exercised. The pipe heat used may cause a dry atmosphere with a correct temp.; the syringe, even in winter, is beneficial. With the exception of *V. teres*, *Amesiana*, *caerulea* and *Kimballiana*, compost in winter must not get dry. All the harder-leaved kinds should be exposed to light in autumn. At all times draughts should be avoided. Shading is needed in summer, varied according to leaf texture.

PROPAGATION: The taller stemmed kinds, in time, lose their bottom leaves and the stems can be severed below some healthy stem roots in spring. The severed portion may be potted carefully, guiding the roots into the compost. The base may remain in the old pot and usually develops growths which may eventually form a specimen or may be removed when rooted and potted singly. Basal growths are sometimes produced without severance of the stem.

SPECIES CULTIVATED: A selection—*V. Amesiana*, stem short, scape tall, branched, very fragrant, white, rose-flushed, lip deep rose to purple; winter, spring, Burma, N. India; *amoena*, bluish-grey, with deeper spots, lip white, violet-blue, probably a natural hybrid, summer, Burma; *Bensonii*, yellowish, marked chestnut, lip whitish, rose-purple, spring, autumn, Burma; *bicolor*, near *Bensonii*, yellowish-brown, lip whitish, mid-lobe lilac, spring, N. India; *Charlesworthii*, hybrid; *caerulea*, beautiful, variable, large, varying from a soft bluish-grey to deep blue, with darker veins, autumn, various, N. India, Assam, Burma, many named vars. are known; *caerulescens*, rather small, mauve-blue, lip violet-blue, pretty, spring, summer, Burma; *concolor*, fragrant, yellowish-brown, lip white, red, streaked brown, spring, summer, China, Java, Sumatra; *cristata*, dwarf, few, yellowish, mid-lobe reddish with whitish lines, summer, N. India; *Dearei*, tall, three to five large, fragrant, cream-yellow, summer, Borneo, Sunda Isles; *Denisoniana*, ivory white, summer, Burma; *helvola*, red to pale purple, spring, Java; *Hookeriana*, slender, beautiful, white, rose or purple flushed, petals purple spotted, lip white, spotted purple, leaves cylindrical, heat and moisture required all the year, autumn and various, Borneo, Malaya; *insignis*, yellow, with chocolate spots, lip, mid-lobe, rose-purple, concave, summer; *Kimballiana*, white or purplish flushed, lip amethyst-purple, scapes often branched, leaves cylindrical, tapered, autumn, various, Burma; *lamellata*, yellow, blotched chestnut, autumn, Philippines; *limbata*, cinnamon-brown, margined yellow, lip rose-lilac, margined white, summer, Java; *luzonica*, white, dotted and splashed with crimson-purple, lip crimson and white, autumn, Philippines; *Moorei*, a natural hybrid, lilac-purple, variable; *parviflora*, small, many, yellowish, lip whitish, purple marked, summer, N. India, Burma; *Roeblingiana*, brownish, veined yellowish, lip white, purple streaked, mid-lobe two-lobed, fringed, summer, Malaya; *Sanderiana* (syn. *Euanthe Sanderiana*), seven to fifteen, large, rose, whitish, tawny, red spotted and flushed, lip small, tawny yellow, red streaked, chocolate, purple, very variable, various, Philippines; *Stangeana*, greenish-yellow, suffused and marked red-brown, lip white and mauve, summer, Assam; *teres*, two to five, large, variable, whitish, rose, rose-magenta, lip funnel-like, orange, mid-lobe expanded, magenta-rose, stems 2 to 7 ft. or more, leaves cylindrical, no shading, spring, summer, N. India, Burma, many vars.; *tesselata* (syn. *V. Roxburghii*), fragrant, greenish, tessellated brown, mid-lobe of lip violet-purple, variable, summer, autumn, N. India, Burma, Ceylon; *tricolor*, handsome, very variable, typically yellow, with brownish-red spots, lip whitish, mid-lobe purplish, autumn, various, Java, so variable is the species that very many varietal names have been given; *Watsonii*, many, pure white, lip margin fringed, leaves and flowers set closely, various, Annam.

Vandopsis—*Orchidaceae*. An epiphytic genus. The name is applied to Vanda-like plants in which a distinction from that genus is that the obscurely three-lobed lip has its centre formed into a more or less prominent ridge. Authorities are not all agreed as to the limits of the genus.

CULTURE: Compost, temps. as for the warmer-growing Vandas. Waterings

are required in the winter but consideration must be given to the hard-leaf texture of some.

PROPAGATION: As for Vandas.

SPECIES CULTIVATED: *V. gigantea* (syn. *Vanda gigantea*), large, fleshy, six to fifteen, yellow with chestnut brown spots, spring, summer, Burma; *lissochiloides* (syn. *Vanda Batemannii*), large, twelve to twenty, yellow, densely spotted with red-purple, crimson behind lip, buff yellow to purplish, summer, Philippines, Moluccas; *Parishii* (syn. *Vanda Parishii*), fragrant, yellowish, spotted red-brown, lip magenta-purple, leaves broad, almost oblong, summer, Burma.

Vanilla—Orchidaceae. Sixty or seventy species of climbing orchids, stems often long and branching, some losing all connection with the ground, some leafless, some with fleshy or leathery leaves. Scapes axillary or lateral. Flowers few or several, comparatively large in some species. One species, *V. fragrans*, is largely cultivated abroad, as the essence 'Vanilla' is obtained from its seed pods.

CULTURE: Compost, two parts osmunda fibre or peat, two parts sphagnum moss, small pots well drained. The leafed species can be used as roof climbers. The leafless should be placed against a wall, failing that a pole or bar covered with a thin layer of compost. A moist, warm atmosphere is required throughout the year. The syringe freely used in summer, required less in winter. Winter temp. 70°, summer temp., with shading, considerably higher with sun heat.

PROPAGATION: The leafed species by cuttings, side branches may be taken off or the main stem cut into lengths as desired provided roots are present. The leafless species often resent attempts to propagate. Side branches, if any, may be attempted.

SPECIES CULTIVATED: A selection—*V. fragrans* (syn. *V. planifolia*), eight to twenty, fragrant, whitish-green or yellowish, yellow, summer, Mexico; *Humboldtii*, large, light yellow, lip with crimson hairs in throat, leafless, summer, Madagascar; *Phalaenopsis*, six to seven, white, rose flushed, lip orange, pale rose, leafless, summer, Madagascar; *Pompona* (syn. *V. lutescens*), near *V. fragrans*, six to eight, yellow, summer, autumn, Brazil; *Walkerae*, many, white, leafless, Ceylon, India.

Variegated Laurel, see *Aucuba*.

Vegetable Marrow, see *Cucurbita Pepo*; **-Oyster**, see *Tragopogon porrifolius*.

Veltheimia—Liliaceae. Greenhouse bulbous plants. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam, one part well-decayed cow manure, and little sand. Position, light, sunny greenhouse or window Sept. to June; sunny, cold frame remainder of year. Pot bulbs of *V. viridifolia* Aug. to Nov.; those of *V. glauca* Oct. to March. Place bulbs with point just below surface of compost. Press compost firmly in pots. Water moderately when new growth commences, freely when in full growth, keep nearly dry when leaves die off. Apply stimulants occasionally when the plants are growing freely. Temp., Sept. to March 40° to 50°, March to June 55° to 65°.

PROPAGATION: By offsets, removed from parent bulbs, placed in small pots, and treated as advised for large bulbs; by leaves removed close to bulbs and inserted singly in pots of sandy soil in spring or summer; by seeds sown as soon as ripe in sandy soil in temp. 55° to 65°.

SPECIES CULTIVATED: *V. Deasii*, pinkish, tinged green, winter, 1 ft., S. Africa; *glauca*, yellow, tinged red, March, 1 to 1½ ft., S. Africa; *viridifolia*, 'Unicorn-root', yellow, tinged red, winter, 1 to 1½ ft., S. Africa.

Velvet Flower, see *Amaranthus caudatus*; **-Grass**, see *Holcus lanatus*.

Venidium—Compositae. Half-hardy annuals and perennials. All treated as half-hardy annuals.

CULTURE: Soil, ordinary. Position, sunny borders. Sow seeds in light soil in temp. 50° to 55°, March or April, transplanting seedlings outdoors May or June.

SPECIES CULTIVATED: *V. decurrens* (syn. *V. calendulaceum*), yellow and purplish-brown, summer, 2 ft., S. Africa, perennial treated as annual; *fastuosum*, orange and purplish-black, summer, 1½ to 2½ ft., S. Africa.

Venus's Flytrap, see *Dionaea muscipula*; **-Looking-glass**, see *Specularia Speculum-Veneris*.

Veratrum (False Hellebore)—*Liliaceae*. Hardy herbaceous perennials with large, much ribbed, green leaves and poisonous roots. First introduced mid-sixteenth century.

CULTURE: Soil, light ordinary or peaty. Position, partially shady, moist borders. Plant, Oct., March or April.

PROPAGATION: By seeds sown in peaty soil in deep pans in cool greenhouse during Feb. or March; division of roots, Oct. or April. Seed frequently takes several months to germinate.

SPECIES CULTIVATED: *V. album*, white, July, 3 to 4 ft., Europe; *californicum*, greenish-white, summer, to 6 ft., California; *nigrum*, maroon, summer, 4 to 5 ft., Europe; *viride*, yellowish-green, July, 5 to 8 ft., N. America.

Verbascum (Mullein)—*Scrophulariaceae*. Hardy biennial and perennial herbs.

CULTURE OF BIENNIAL SPECIES: Soil, ordinary. Position, sunny borders. Sow seeds in light, rich soil in sunny position outdoors in April, transplanting seedlings when three or four leaves form, 6 in. apart in sunny position until following April, then plant where required to flower.

CULTURE OF PERENNIAL SPECIES: Soil, deep, light, rich ordinary. Position, sunny borders. Plant, Oct., March or April.

PROPAGATION: By seeds, as advised for biennial species; division of roots in March or April; root cuttings taken early in the year.

BIENNIAL SPECIES CULTIVATED: *V. olympicum*, 'Olympic Mullein', yellow, summer, 6 ft., Greece; *Thapsus*, yellow, summer, to 6 ft., Europe (Br.) and Asia.

PERENNIAL SPECIES CULTIVATED: *V. Chaixii*, 'Nettle-leaved Mullein', yellow, summer, 3 ft., S.W. Europe; *longifolium*, yellow, July to Aug., 4 to 6 ft., Europe, and var. *pannosum*; *nigrum*, 'Dark Mullein', yellow, summer, 3 ft., Europe (Br.); *Pestalozzae*, yellow, June, 4 to 6 in., Europe; *phoeniceum*, 'Purple Mullein', violet and red, summer, 3 ft., Europe; *thapsiforme* (syn. *V. densiflorum*), yellow, summer, to 5 ft., Europe; *Wiedemannianum*, blue and purple, summer, to 3 ft., Asia Minor. There are numerous hybrids.

Verbena (Vervain)—*Verbenaceae*. Greenhouse half-hardy perennials. Present race of bedding verbenas originally derived from *V. teucrioides* and other species. First introduced mid-eighteenth century.

CULTURE OF V. TEUCRIOIDES: Compost, two parts good turfy loam and one part of equal proportions of decayed manure, leaf-mould and sharp silver sand. Position, pots in light greenhouse, or cold frames in summer. Pot, Feb. to May. Water freely April to Oct., moderately afterwards. Apply stimulants two or three times weekly to plants in flower. Nip off points of shoots during spring to induce bushy growth, discontinue six weeks before plants are required to flower. Young plants struck from cuttings or raised from seed best suited to pot culture. Temp., Oct. to March 40° to 50°, March to June 55° to 65°. Shade from sun.

OUTDOOR CULTURE: Soil, good ordinary, liberally enriched with decayed manure. Position, sunny beds or borders. Plant 12 in. apart each way in June. Water freely in dry weather. Peg shoots to surface of bed as they grow, and when they meet each other nip off their points.

CULTURE OF V. CANADENSIS, V. LACINIATA AND V. TENERA: Soil, ordinary. Sow seeds in pans of sandy soil in temp. 60° during Feb. or March, transplanting seedlings to deep boxes when large enough to handle and hardening off for planting outdoors in sunny beds or borders during May. Really perennials but are best treated as half-hardy annuals.

CULTURE OF V. RIGIDA AND V. BONARIENSIS: Soil, ordinary rich. Position, sunny beds or borders. Plant, May. Lift roots in Oct., store in ordinary soil in boxes

in frost-proof place until March, then place in temp. 55°, and when new shoots form remove these with portions of old roots, place in small pots, harden off, and plant out 12 in. apart in May; or plant old roots, dividing them, if necessary, direct into beds in April. Peg shoots of *V. rigida* down as they grow. May be grown outdoors altogether in well-drained soils in sheltered districts.

CULTURE OF *V. PERUVIANA*: Soil, ordinary. Position, sunny beds or rock gardens. Insert cuttings of current year's growth in Aug. and Sept. in boxes filled with sandy soil and place in frost-proof frame or greenhouse until May, then plant in the open. Plants may survive outdoors in a mild winter.

PROPAGATION: Garden verbenas by seeds sown $\frac{1}{16}$ in. deep in pots, pans or boxes filled with a compost of equal parts loam and leaf-mould and little sand, placed in a temp. 65° to 75° in Jan., Feb. or March, transplanting seedlings when third leaf forms in boxes or pans, placing these on shelf near glass in temp. 55°, transferring when fairly strong singly to 2½ in. pots, and later on to a larger size; by cuttings inserted in a bed of sandy soil in cold frame in Aug., lifting cuttings when rooted and planting 2 in. apart in boxes or pans and storing in shelf in greenhouse until March, then potting off singly in small pots; or young shoots taken off in Feb. or March and inserted in damp sand under bell-glass in temp. 65°.

SPECIES CULTIVATED: *V. bonariensis*, purplish-lilac, summer, 4 to 5 ft., S. America; *canadensis* (syns. *V. Aubletia* and *V. Drummondii*), purple or lilac, summer, 1 ft., N. America; *laciniata*, lilac, summer, trailing, Peru; *peruviana*, scarlet, summer and autumn, trailing, Brazil, Peru, etc.; *radicans*, lilac, trailing, summer, Brazil; *rigida*, claret-purple, summer, 2 ft., Argentine; *tenera*, blue or lilac, summer, trailing, Southern S. America; *teucrioides*, yellowish-white or pink, summer, 1 ft., Brazil, etc.

Veronia (Ironweed)—*Compositae*. Hardy herbaceous flowering plants. First introduced early eighteenth century.

CULTURE: Soil, rich, sandy loam. Position, sunny borders. Plant, March or April. Top-dress with decayed manure in spring.

PROPAGATION: By seeds sown in sandy soil in a cold frame in March or April, or outdoors in a sunny border in April; also by division of the roots in March or April.

SPECIES CULTIVATED: *V. altissima*, purple and violet, autumn, 4 to 10 ft., U.S.A.; *crinita* (syn. *V. arkansana*), purple, autumn, 4 to 12 ft., N. America; *noveboracensis*, purple, summer, 4 to 9 ft., U.S.A.

Veronica (Speedwell)—*Scrophulariaceae*. Hardy herbaceous perennials. Shrubby New Zealand species have been transferred to *Hebe*.

CULTURE: Soil, ordinary rich. Position, sunny borders or rockeries; water-garden for *V. Anagallis* and *V. Beccabunga*. Plant, Sept. to Nov. or Feb. to May. Lift, divide and replant about every third year. Water freely in dry weather.

PROPAGATION: By division of roots in autumn or spring; seeds sown in light soil in shade outdoors in April.

SPECIES CULTIVATED: *V. Allionii*, violet-blue, June to July, 2 in., S.W. Europe; *Anagallis*, 'Water Speedwell', pale blue, 6 to 18 in., Europe; *Beccabunga*, 'Brook Lime', blue, succulent, 9 to 12 in., Europe; *caespitosa*, pink, May to June, 1 to 2 in., Greece; *canescens*, pale blue, July, prostrate, New Zealand; *cinerea*, pink, July to Aug., 3 to 4 in., Asia Minor; *filiformis*, china blue, May to June, 3 in., Asia Minor; *fruticans* (syn. *V. saxatilis*), blue, July, shrubby, 6 in., Europe; *gentianoides*, blue, June, 8 to 12 in., S.E. Europe, and var. *variegata*, leaves variegated with white; *incana*, blue, summer, 18 in., S. Europe; *latifolia* (syn. *V. Teucrium*), blue, May to June, 1½ ft., Europe, and vars. *dubia*, *prostrata* and *rosea*; *linifolia*, white or pale pink, June, 6 to 8 in., New Zealand; *maritima* (syn. *V. longifolia*), lilac-blue, Aug., 1½ to 2 ft., Europe, and var. *subsessilis*, deep blue; *orientalis*, pink, summer, 6 to 8 in., Asia Minor; *pectinata*, pale blue, May to June, 6 in., Caucasus; *repens*, pale blue, summer, 2 to 3 in., creeping, Corsica; *saturejoides*, deep blue, April, 3 in., Dalmatia; *spicata*, blue, July, 12 to 18 in., Europe, and vars. *alba*, white, *corymbosa*, pale blue, and *rosea*, pink.

Verschaffeltia—*Palmae*. Stove palm with bright green roundish leaves, divided at tips. First introduced mid-nineteenth century.

CULTURE: Compost, two parts fibrous peat, one part equal proportions charcoal, turfy loam and sand. Position, moist, shady part of stove. Pot, Feb. or March. Syringe freely twice daily Feb. to Oct., once daily afterwards. Water freely at all times. Shade and moist atmosphere essential. Temp., March to Oct. 70° to 85°, Oct. to March 65° to 75°.

PROPAGATION: By seeds sown 1 in. deep in peat and loam in small pots in temp. 75° to 85°, spring.

SPECIES CULTIVATED: *V. splendida*, 12 to 80 ft., Seychelles.

Vervain, see *Verbena*.

Vesicaria—*Cruciferae*. Hardy perennial with large inflated pods following flowers. First introduced early eighteenth century.

CULTURE: Soil, ordinary. Position, sunny borders or rock gardens. Plant, autumn or spring.

PROPAGATION: By division; seed sown in spring.

SPECIES CULTIVATED: *V. utriculata*, yellow, May to June, large, inflated seed pods, to 1½ ft., Europe.

Vetch, see *Vicia*; **Kidney-**, see *Anthyllis Vulneraria*.

Viburnum—*Caprifoliaceae*. Extensive group of hardy deciduous and evergreen flowering shrubs. Some have beauty of blossom, others of fruit and autumn-tinted foliage.

CULTURE: Soil, deep moist loam, preferably rich. Many species thrive in partial shade. In borders, or as single specimens, in moderately sheltered positions. Avoid dry positions. No routine pruning, but avoid overcrowding on older specimens, removing weak shoots in winter.

CULTURE OF LAURUSTINUS: Soil, deep sandy loam. Position, warm, sheltered shrubberies, etc.; useful for town gardens. Plant, Sept., Oct. or April. *Laurustinus* makes a good hedge to 6 or 8 ft. high, flowering in winter. Space at 2 to 2½ ft. apart, and clip or prune in April or May, is also suitable for pot culture for flowering in cold greenhouses in winter. Pot, spring. Position, outdoors in semi-shady position, May till Oct.; in cold greenhouse, Oct. to May. Water freely while outdoors, moderately in winter.

PROPAGATION: By cuttings of half-ripened shoots inserted in sandy loam under bell-glass in gentle bottom heat during July and Aug.; layering shoots in Sept. or Oct.

DECIDUOUS SPECIES CULTIVATED: *V. alnifolium*, 'Hobble Bush', white, June, dark purple fruits, 6 to 10 ft., Eastern N. America; *betulifolium*, berries like red currants, freely borne, 10 to 15 ft., China; *bitchiuense*, pink and white, fragrant, May, resembling *V. Carlesii* but more straggling, 6 to 10 ft., Japan; *bodnantense*, pink and white, winter, fragrant, hybrid; *Carlesii*, blush in bud, opening white, very fragrant, April to May, 3 to 4 f., Korea; *Carlcephalum*, as preceding, larger flowers, stronger growth, very fragrant, hybrid; *corylifolium*, red berries, autumn tints, 6 to 8 ft., Cent. and W. China; *dasyanthum*, red fruits, 6 to 8 ft., Cent. China; *dentatum*, 'Arrow Wood', white, June, 15 ft., N. America; *dilatatum*, white, June, oval bright red berries, 6 to 9 ft., Japan and China; *erubescens*, pale pink, June, fruit red, changing to black, to 20 ft., Himalaya, W. China; *fragrans*, pale pink, fragrant, winter, 6 to 9 ft., N. China; *furcatum*, resembling *V. alnifolium*, more upright, 6 to 9 ft., China; *grandiflorum*, pink and white, winter, to 8 ft., Himalaya; *hupehense*, red berries, 5 to 8 ft., Cent. China; *ichangense*, white, small, numerous, May, red fruits, 4 to 6 ft., Cent. and W. China; *Juddii*, compact growth, hybrid; *kansuense*, pink, June, red fruits, maple-like foliage, 4 to 8 ft., China; *Lantana*, 'Wayfaring Tree', white, June, fruits red, changing to black, autumn-tinted foliage, 10 to 15 ft., Europe, including Britain; *Lentago*, 'Sheepberry', white, May to June, dark blue fruits, 20 to 30 ft., Canada to Georgia; *lobophyllum*, bright red berries, 10 to 15 ft., Cent. and W. China; *macrocephalum*, 'Chinese Snow-

ball', white, May, 12 to 15 ft., with var. *sterile*, flowers larger than our native Guelder Rose; *Opulus*, white, June, autumn tints and scarlet berries, 10 to 15 ft., Europe, N. Africa, N. Asia, and vars. *roseum* (syn. var. *sterile*), 'Snowball', 'Guelder Rose', large flowered, non-fruiting form of gardens, and *xanthocarpum*, fruits yellowish-amber; *trilobum*, 'Cranberry Bush', scarlet fruits, 8 to 10 ft., U.S.A.; *tomentosum*, white, May, horizontal branches, 6 to 10 ft., China and Japan, and vars. *Mariesii* and *sterile*, 'Japanese Snowball', both very free-flowering.

EVERGREEN SPECIES CULTIVATED: *V. Burkwoodii*, white, April to May, fragrant, attractive easily grown shrub, 6 to 8 ft., hybrid; *cinnamomifolium*, to 8 ft., W. China; *Davidii*, dull white, June, attractive turquoise-blue berries, leathery leaves, 2 to 3 ft., W. China; *Harryanum*, black fruits, small leaves, 5 to 8 ft., W. China; *Henryi*, white, June to July, fruits red, changing to black, free, 10 ft., China; *propinquum*, blue fruits, lustrous narrow leaves, 2 to 3 ft., Cent. and W. China; *rhytidophyllum*, dull white, May to June, fruits red then black, large wrinkled leaves, vigorous, 8 to 12 ft., Cent. and W. China, with var. *roseum*, flowers bright pink on back; *Tinus*, 'Laurustinus', white, Nov. to April, to 10 ft., S.E. Europe, with vars. *hirtum*, larger leaves and taller, rather tender, *lucidum*, larger leaves, rather tender, and *variegatum*, leaves yellow variegated; *utile*, white, May, dark blue fruits, leaves white beneath, 4 to 6 ft., Cent. China.

Vicia (Vetch)—*Leguminosae*. Mostly tendril-climbing vines. The seeds of one species (Broad Bean) are used as a vegetable and some species cultivated as forage plants.

CULTURE OF BROAD BEANS: Soil, rich, well-manured, moist loam for main crops; lighter, rich soil for early ones. Position, south borders for early crops; open garden for main or late ones. Sow early longpod vars. in Feb., maincrop sorts in March and April. Distances, drills 3 in. deep and 1½ ft. apart. Seeds to be 9 in. apart in drills. Nip out growing points of plants when first flowers open. Mulch late crops with decayed manure, especially on light soils. Crop ready for use eighteen weeks after sowing. Seeds take twelve to fourteen days to germinate. Seeds retain their germinating powers one year. Quantity of seeds to sow a row 50 ft. long, 1 pint.

CULTURE OF PERENNIAL SPECIES: Soil, ordinary. Position, sunny rock garden or front of border. Plant, Oct. to Nov. or March to April.

PROPAGATION: Perennial species by seed sown in cold frame in March.

ANNUAL SPECIES CULTIVATED: *V. Faba*, 'Broad Bean', white, June and July, 3 ft., N. Africa, S.W. Asia.

PERENNIAL SPECIES CULTIVATED: *V. oroboides* (syn. *Orobis lathyroides*), white or yellow, summer, 2 ft., Europe.

Victoria (Queen Victoria Water-lily)—*Nymphaeaceae*. Stove aquatic plant. Leaves, roundish, flat, with turned-up edges; bronze-green; 4 to 6 ft. diameter; floating. First introduced early nineteenth century.

CULTURE: Compost, two parts good, rich turfy loam, one part decayed cow manure. Position, large tank 6 ft. deep and 20 to 25 ft. wide. Plant, May. Temp. of water, 80° to 85°. Temp. of atmosphere, March to Sept. 75° to 85°, Sept. to March 65° to 70°. No shade required.

PROPAGATION: By seeds sown in pot of sandy loam submerged in water heated to temp. of 85° and placed near glass in light position, Jan. When seedlings appear above surface, transplant singly in small pots and place in water again until May, then plant out as above advised. *V. regia* is strictly a perennial, but thrives best treated as an annual in this country.

SPECIES CULTIVATED: *V. Cruziana*, will succeed in cooler temp., rose, Bolivia; *regia*, 'Royal Water-lily', white, rose, and purple, summer, Trop. America.

Victoria Water-lily, see *Victoria regia*.

Victorian Box, see *Pittosporum undulatum*.

Villarsia—*Gentianaceae*. Hardy marsh and aquatic herbs with pretty yellow flowers. First introduced late eighteenth century.

CULTURE: Position, at pond margin in wet soil or shallow water. Soil, immaterial. Plant, spring.

PROPAGATION: By division in spring or autumn; seeds sown in pans of sandy loam standing in saucers of water.

SPECIES CULTIVATED: *V. ovata*, citron, July to Sept., 6 to 12 in., Africa; *parnasifolia* 1 to 2 ft., yellow, Australia. See also *Nymphoides*.

Vinca (Periwinkle)—*Apocynaceae*. Hardy and tender evergreen and deciduous trailing sub-shrubs or herbs.

CULTURE OF STOVE SPECIES: Compost, two parts fibrous loam, one part decayed manure and a little silver sand. Position, well-drained pots in stove Sept. to June, sunny cold frame or greenhouse remainder of year. Pot, Feb. or March. Prune shoots of old plants to within 1 or 2 in. of their base in Jan. or Feb. Water freely April to Oct., moderately afterwards. Apply weak stimulants occasionally during summer and autumn. Nip off points of shoots in young or old plants once or twice during July and Aug. to ensure bushy habit. Temp., March to June 65° to 75°, Sept. to March 55° to 65°. Alternatively, *V. rosea* may be treated as a tender annual. Sow seeds in temp. 70° during Feb. or March and transplant seedlings to small pots as soon as large enough to handle.

CULTURE OF HARDY SPECIES: Soil, ordinary. Position, flowers best in sunny places beneath hedges or on banks, also useful as ground cover in shady places beneath trees. Cut back in early spring.

PROPAGATION: By cuttings of young shoots removed when 2 or 3 in. long and inserted in sandy soil under bell-glass in temp. 65° to 75° in spring, or seed in temp. 70° during Feb. for *V. rosea*; hardy species, division in March or April.

STOVE SPECIES CULTIVATED: *V. rosea*, 'Madagascar Periwinkle', rose, summer, 1 to 2 ft., Tropics, and var. *alba*, white.

HARDY SPECIES CULTIVATED: *V. difformis* (syn. *V. media*), pale lilac-blue, Dec. to March, 1 ft., for warmest districts, S.W. Europe; *major*, 'Large Periwinkle', bright blue, May to Oct., trailing, 1 to 2 ft., Europe (Br.), and var. *variegata* (syn. var. *elegantissima*), leaves blotched and margined yellow-white; *minor*, 'Lesser Periwinkle', blue, summer, trailing, Europe (Br.), and numerous vars.

Vine, see *Vitis*.

Viola (Violet; Pansy)—*Violaceae*. Hardy herbaceous perennial herbs.

CLASSIFICATION: Pansies in general—Any free-growing or free-flowering strain, self-coloured or variegated. Show Pansy—Blooms circular, flat and smooth, without wavy or crinkled edges, diameter 1½ in. Fancy Pansy—Blooms circular, flat and smooth, with wavy or crinkled edges. Tufted Pansy—A name applied to a class of pansies commonly called 'violas', hybrids of the ordinary pansy and the Horned Violet (*V. cornuta*); blooms smaller than those of ordinary pansies; colours varied; habit, dwarf, not spreading as in the pansy. Violetta—Strain of very dwarf pansies, the result of a cross between a pansy and *Viola cornuta*; flowers, small, rayless and fragrant.

CULTURE OF SHOW, FANCY AND TUFTED PANSIES AND VIOLETTAS: Soil—(a) deep, rich, moist loam enriched with well-decayed cow manure; (b) two parts loam, one part of equal proportions of leaf-mould and sand; (c) ordinary light soil enriched with cow manure; (d) clay or heavy soils with decayed horse or cow manure. Soil best manured and dug previous autumn. Position, open, light, sheltered, away from roots and branches of trees, and shaded from mid-day sun. Plant pansies in Sept., Oct. or April, 12 in. apart each way; tufted pansies, March or April, 10 in. apart each way. Mulch with leaf-mould in May or June. Stir the surface frequently. Water copiously in dry weather, applying it in the evening. Remove all flower buds until plants are established. If exhibition blooms are desired allow only one bloom to grow on each shoot. Feed once a week during the growing season with a weak solution of a compound fertiliser.

CULTURE OF VIOLET: Soil, ordinary, previously well enriched with well-

decayed manure. Clay soils require plenty of grit, decayed vegetable refuse and manure incorporated with them. Light and gravelly soils need a liberal amount of cow manure and loam or clay mixed with them. Position, border or bed on north or north-east side of hedge or under the shade of fruit trees. Full exposure to hot summer sun undesirable. Plant crowns 9 in. apart in rows 12 in. asunder, April. 'Crowns' are portions separated from parent plant, each furnished with roots. Water when first planted and shade from sun. Apply manures recommended for pansies at intervals of three weeks during summer. Remove runners, i.e. shoots that issue from the crowns, as they form during summer and keep plants free from weeds. Lift plants for winter blooming in Sept. and replant, 6 to 8 in. apart, in equal parts good soil and leaf-mould in a cold, sunny frame. Water freely in fine weather. Protect from frost. In case of deep frames, decayed manure may be used to fill up space to within 12 in. of light, putting 6 in. of above soil on this. Replant annually.

POT CULTURE: Compost, two parts loam, one part leaf-mould and one part sand. Pot, April, placing six crowns in a 6 in. pot. Place in a shady frame and water moderately. Plunge pots to their rims outdoors in shade in May and let them remain till Sept., when remove to greenhouse. Water freely outdoors, moderately in winter. Winter temp., 40° to 50°.

CULTURE OF OTHER SPECIES: Soil, ordinary rich. Position, moist, partially shaded rockeries, beds or borders. Plant, March or April, 3 to 6 in. apart.

PROPAGATION: By seeds sown in light, sandy soil in boxes or pans in cold, shady frame in July or Aug., transplanting seedlings into flowering positions in Sept. or Oct.; cuttings inserted in cold, shady frames in Aug. or Sept.; divisions in Sept. or Oct.; violets by runners in April.

SPECIES CULTIVATED: *V. alpina*, purple, May, 3 in., E. Europe; *altaica*, 'Altaian Violet', lilac-purple or yellow, May, 6 in., Taurus and Asia Minor; *arborescens*, lavender blue, 6 to 8 in., S. France; *Beckwithii*, purple and pale lilac, 3 to 4 in., California; *biflora*, 'Twin-flowered Violet', yellow, June, 3 in., Europe and N. Asia; *calcarata*, 'Spurred Violet', violet or variable, May to June, 4 in., Europe (Br.); *canadensis*, white, yellow, and violet, 12 in., N. America; *canina*, 'Dog Violet', blue or white, May, 3 to 4 in., Europe (Br.); *cenisia*, violet-purple, 3 to 4 in., Alps; *cornuta*, 'Horned Violet', blue, summer, 6 in., Pyrenees, one of the parents of the Garden Viola or Tufted Pansy; *cucullata*, 'Hollow-leaved Violet', violet, spring, 3 to 4 in., N. America; *elegantula* (syn. *V. bosniaca*), rosy mauve, May to June, 4 in., S.W. Europe; *gracilis*, 'Olympian Violet', violet-purple, June, 4 to 6 in., Macedonia and Asia Minor; *hederacea* (syn. *Erpetion reniforme*), purple and white, summer, 2 to 3 in., Australia; *lutea*, 'Mountain Violet', yellow, June, 3 in., Europe (Br.); *Munbyana*, 'Munby's Violet', violet or yellow, spring, 6 to 12 in., Medit. Region; *nummularifolia*, blue and blackish violet, summer, 3 to 4 in., Maritime Alps; *odorata*, 'Sweet Violet', blue, spring, 6 in., Europe (Br.), and numerous vars.; *palustris*, 'Marsh Violet', pale lilac to white, May, 3 to 4 in., N. Europe (Br.); *pedata*, 'Bird's-foot Violet', violet and lilac, May, 6 in., N. America, and var. *alba*, white; *pedunculata*, orange-yellow, summer, 6 to 8 in., California; *pinnata*, rosy lilac, May to June, 2 to 3 in., Europe; *sylvestris*, 'Wood Violet', blue, spring, 6 in., Europe; *tricolor*, 'Heartsease', yellow, purple, and white, summer, 6 in., Europe (Br.), one of the parents of the Pansy.

Violet, see *Viola*.

Viper's Bugloss, see *Echium*.

Virginian Cowslip, see *Mertensia virginica*; **-Creeper**, see *Parthenocissus quinquefolia*; **-Poke**, see *Phytolacca americana*; **-Snowflower**, see *Chionanthus virginica*; **-Stock**, see *Malcomia maritima*; **-Willow**, see *Itea virginica*.

Virgin's Bower, see *Clematis*.

Viscaria, see *Lychnis*.

Viscum (Mistletoe)—*Loranthaceae*. Hardy evergreen parasitical plant with white berries; male and female flowers are borne on separate plants.

CULTURE: Cut a notch in bark on underside of branch and press ripe berry gently into it in March. Young plants grow slowly for two or three years. Trees suitable for mistletoe culture: Apple, hawthorn, poplar, lime, maple, mountain ash, cedar, larch and oak; two first most suitable.

SPECIES CULTIVATED: *V. album*, green, March, Europe (Br.).

Vitex—*Verbenaceae*. Slightly tender, deciduous, aromatic, flowering shrubs. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, sheltered, warm border or against south wall in southern districts. In open, mildest areas only. Plant, Oct. to Feb. Prune out older wood, Feb.

PROPAGATION: By cuttings of shoots inserted in ordinary light, sandy soil under bell-glass in cool greenhouse or cold frame, Sept. or Oct.

SPECIES CULTIVATED: *V. Agnus-castus*, 'Chaste Tree', 'Tree of Chastity', violet blue, Sept. to Oct., to 10 ft., S. Europe, with var. *alba*, flowers white; *Negundo*, 'Chinese Chaste Tree', lavender blue, autumn, 10 ft., China, var. *incisa*, deeply toothed leaves.

Vitis (Vine)—*Vitaceae*. Hardy and greenhouse climbing shrubs, some species grown for fruit and others for screen or wall cover. Some species formerly included in this genus have been reclassified and will be found under *Ampelopsis*, *Parthenocissus* and *Cissus*.

CULTURE OF GRAPE VINE UNDER GLASS: A border should be prepared, 3 ft. deep and the length of the house, and 10 to 12 ft. wide, sloping slightly to the front. Surround this with brick or concrete so that the roots do not penetrate to unprepared soil. Provide drainage with a 9 in. layer of rubble and cover this with a layer of turves grass side downwards. Fill the border with a well-mixed compost of eight parts chopped turf, one part old mortar rubble, half a part wood ashes, quarter part charcoal broken to the size of peas. Add $\frac{1}{2}$ lb. bonemeal to each bushel of the mixture. Purchase vine in Nov. and stand pot in house; cut back so that top eye is level with bottom pane of glass. Plant as growth commences in Feb. to March, covering upper roots with 2 in. of soil. Water in freely. Single rods 5 to 6 ft. apart. If the prepared border is outside the house take rod through a hole in brickwork near soil level and fill space with straw or sacking.

PRUNING: Vines are thinned and stopped periodically during the spring and summer and the laterals pruned back to within two buds of the main rod in winter.

STARTING VINES: Lower rods from training wires. Start between Jan. to March according to date when fruit required. Close ventilators and raise temp. by fire heat to 50° at night. Water the border and mulch with 3 in. rotted manure. Syringe with tepid water to maintain a moist atmosphere. Retie rods when growth starts. Thin berries each fortnight from time they form, using stick and scissors.

VENTILATION AND WATERING: Ventilate as freely as is consistent with maintenance of necessary temp. Keep moist atmosphere by syringing until colouring commences then allow temp. to rise slightly. Water border thoroughly whenever it appears dry on surface. Feed with vine fertiliser in winter and spring.

POT CULTURE: Two-year-old plants established in 10 or 12 in. pots best adapted for fruit in pots. No potting on required. Place in temp. 60°, Nov. to Feb. Give little water till buds break, then apply freely. Increase temp. to 65° after buds break, and to 75° when in flower; lower to 68° afterwards until stoning is completed, when again raise to 70°. Allow above temp. to be increased 5° to 10° by sun heat. Syringe daily until vines flower. Thin berries. Apply liquid stimulant three times weekly after berries form and until they are ripe. Allow each vine to carry six to eight bunches—8 to 10 lb. altogether.

CULTURE OF HARDY ORNAMENTAL VINES: Soil, good ordinary, enriched with

decayed manure. Position, walls or fences, arbours, trellises, poles, pergolas, etc. Plant in autumn.

OUTDOOR CULTURE: Position, against a sunny south wall. Plant, Nov. to March in prepared border and treat as indoor plants though allowing rather freer growth, which is left to start naturally in the spring. Choose hardy early vars. as Brant, Royal Muscadine, Black Hambourg.

PROPAGATION: Grape vine by 'eyes' inserted in sandy compost in temp. 65° to 75° in Jan., Feb. or March; cuttings of shoots, 6 in. long, in shady position outdoors, Oct. or Nov. Ornamental vines by seeds in heat in spring; cuttings of shoots, 6 to 8 in. long, in pots of sandy soil in cold frame in Sept. or Oct.; layering shoots in spring or summer.

FRUITING SPECIES CULTIVATED: *V. Bourguinia*, 'Southern Summer Grape', parent of some vineyard vars.; *cinerea*, 'Sweet Winter Grape', fruit black, N. America; *Doaniana*, fruit black, with bloom, N. America; *Labruscana*, 'Labruscan Grape'; *rotundifolia*, 'Muscadine', dull purple, thick skinned large grapes, a number of vineyard vars., N. America; *vinifera*, 'Wine Grape', the cultivated grape of Europe and of history, fruit variable in form, size and colour, Caucasian Region, var. *apiifolia*, cut-leaved form.

ORNAMENTAL SPECIES CULTIVATED: *V. amurensis*, large leaves colouring to scarlet, Manchuria; *Champinii*, robust climber with glossy green leaves, Texas; *Coignetiae* (syn. *V. Kaempferi*), enormous leathery leaves colouring to yellow, orange and crimson, Japan; *Davidii*, shoots spiny, leaves dark green colouring scarlet, China; *flexuosa*, slender climber, small leaves a metallic bronze-green, Japan, China; *Longii*, 'Bush Grape', Texas; *Thunbergii*, slender climber, rich autumn colour, China.

Vriesia—*Bromeliaceae*. Stove epiphytal perennials with variously coloured flowers and conspicuous bracts.

CULTURE: Compost, equal parts fibrous loam, rough peat, silver sand and leaf-mould. Pot, Feb. or March. Water copiously March to Oct., moderately afterwards. Shade from sun. Syringe daily April to Sept. Moist atmosphere essential in summer. Temp., Sept. to March 60° to 70°, March to Sept. 70° to 80°.

PROPAGATION: By offsets inserted in small pots of sandy peat in temp. 75° to 85° in spring.

SPECIES CULTIVATED: *V. fenestralis*, yellow, leaves marked brown, to 1½ ft., Brazil; *hieroglyphica*, yellowish, leaves banded dark green and brown, Brazil; *speciosa* (syn. *V. zebrina*), yellowish-white, leaves banded dark brown, to 3 ft., Guiana, and var. *major*, robust form. See also Tillandsia.

Wachendorfia—*Haemodoraceae*. Half-hardy tuberous-rooted plants. First introduced early eighteenth century.

OUTDOOR CULTURE: Soil, light, rich sandy. Position, sunny well-drained border. Plant, Sept. to Jan., placing bulbs 4 in. deep and 2 in. apart. Lift and replant bulbs annually. Mulch surface of bed in March with cow manure.

POT CULTURE: Compost, two parts sandy loam, one part leaf-mould or decayed cow manure. Pot, 4½ in. diameter, well drained. Place five bulbs, 3 in. deep, in each pot in Nov. and cover with peat in cold frame or under cool greenhouse stage until growth begins. Water moderately from time bulbs begin to grow until flowers fade, then gradually cease, keeping bulbs dry till Jan. Temp., Sept. to March 40° to 50°, other times 50° to 60°.

PROPAGATION: By offsets, treated as advised for bulbs.

SPECIES CULTIVATED: *W. paniculata*, yellow, April, 3 ft., S. Africa; *thyrsiflora*, yellow, May, 2 ft., S. Africa.

Wahlenbergia (Bell-flower)—*Campanulaceae*. Hardy perennial herbs.

CULTURE OF HARDY SPECIES: Soil, gritty, well drained, containing plenty of well-rotted leaf-mould. Position, sunny rockeries well supplied with moisture during the summer months. Protect Australasian species with hand-light during the winter. Plant, Oct. to April.

PROPAGATION: By seeds sown in a temp. of 55° in March or April; cuttings in summer; division in spring.

HARDY SPECIES CULTIVATED: *W. albo-marginata*, white or blue, summer, 3 to 6 in., New Zealand, frequently wrongly named *W. saxicola*; *gracilis*, blue, summer, 9 in., Australia; *hederacea* (syn. *Campanula hederacea*), 'Creeping Harebell', blue, summer, trailing, Britain; *Mathewsii*, blue, July, 12 to 15 in., New Zealand; *saxicola*, white or pale blue, summer, 9 in., Tasmania; *vincaeflora*, light blue, summer, 1 ft., New Zealand. See also *Edraianthus*.

Wake Robin, see *Trillium grandiflorum*.

Waldsteinia—*Rosaceae*. Hardy perennial herbs. First introduced early twentieth century.

CULTURE: Soil, ordinary rich. Position, on sunny rockeries. Plant, Oct. to April. Cut away flower stems in Sept.

PROPAGATION: By seeds sown $\frac{1}{16}$ in. deep in shallow boxes or well-drained pots of light soil in cold frame, April or July, or in sunny positions (similar depth and soil) outdoors, April or Aug.; division of plants, Oct. to April.

SPECIES CULTIVATED: *W. fragarioides*, 'Barren Strawberry', yellow, June, 6 in., N. America; *siberica* (syn. *W. trifolia*), yellow, summer, 3 to 4 in., Europe.

Wall Cress, see *Arabis*.

Wallflower, see *Cheiranthus*; **Alpine-**, see *Erysimum*; **Siberian-**, see *Erysimum Allionii*.

Wallichia—*Palmae*. Stove feather palms. First introduced early nineteenth century.

CULTURE: Compost, two parts rich loam, one part leaf-mould, little sand. Position, well-drained pots in moist part of stove. Pot, Feb. Water copiously Feb. to Oct., moderately afterwards. Syringe daily in summer. Shade from sun. Temp., March to Oct. 75° to 85°, Oct. to March 55° to 65°.

PROPAGATION: By suckers removed with roots attached, Feb. or March; seeds sown in temp. 80° in Feb. or March.

SPECIES CULTIVATED: *W. caryotoides*, 6 to 9 ft., Himalaya; *densiflora*, 8 to 12 ft., Himalaya; *disticha*, 10 to 15 ft., Himalaya.

Walnut, see *Juglans*.

Wandering Jew, see *Saxifraga sarmentosa* and *Zebrina pendula*.

Waratah, see *Telopea speciosissima*.

Warley Rose, see *Aethionema warleyense*.

Warscewiczella—*Orchidaceae*. An epiphytic genus at one time included in *Zygopetalum*. Habit tufted, pseudo-bulbs absent, scapes one-flowered, freely produced, flowers attractive.

CULTURE: Compost and all conditions as for *Bolleas*, *Pescatoreas*, etc. Any known to come from comparatively cool localities should have a winter night temp. of 60°. With all, use small pans or well-drained pots and repot annually in spring.

PROPAGATION: By division of plants when repotting.

SPECIES CULTIVATED: A selection—*W. amazonica*, white, lip large, white, with forked purple lines, crest fan-shaped, variable, winter, spring, Amazon Basin, Peru; *candida*, white, lip margined violet, and with a central violet irregular blotch, variable, various, Brazil; *discolor*, ivory white, petals tinted purple, lip violet-purple, erect, toothed, variable, summer, Costa Rica; *flabelliformis*, fragrant, white, lip spreading, white, shaded violet, veins purple-violet, summer, Brazil, W. Indies; *marginata*, creamy white, lip margined rose, or rose-purple, disk striated violet-purple, summer, autumn, Colombia; *Wendlandii*, whitish or yellowish, lip white, violet-blue in centre, summer, autumn, Costa Rica, var. *discolor*, fragrant, yellowish-green, violet blotch on lip, larger, brighter.

Washingtonia—*Palmae*. Warm greenhouse palms. Leaves, roundish and fringed with filaments.

CULTURE: Compost, equal parts peat, loam and silver sand. Position, pots in partial shade. Repot, Feb. Water moderately Oct. to April, freely afterwards. Temp., Sept. to March 55° to 65°, March to Sept. 65° to 75°.

PROPAGATION: By seeds sown in above compost in temp. 85° in spring.

SPECIES CULTIVATED: *W. filifera* (syn. *Brahea* or *Pritchardia filamentosa*), 20 to 80 ft., California.

Water Arum, see *Calla palustris*; **-Calthrops**, see *Trapa natans*; **-Carpet**, see *Chrysosplenium*; **-Chestnut**, see *Trapa*; **-Cowslip**, see *Caltha palustris*; **-cress**, see *Nasturtium officinale*; **-Hawthorn**, see *Aponogeton distachyum*; **-Hyacinth**, see *Eichhornia crassipes*; **-Lettuce**, see *Pistia Stratiotes*; **-Lily**, see *Nymphaea* and *Victoria*; **-Locust**, see *Gleditsia aquatica*; **-Melon**, see *Citrullus vulgaris*; **-Milfoil**, see *Myriophyllum*; **-Plantain**, see *Alisma Plantago*; **-Poppy**, see *Hydrocleys*; **-Shield**, see *Brasenia Schreberi*; **-Snowflake**, see *Nymphoides indicum*; **-Soldier**, see *Stratiotes aloides*; **-Thyme**, see *Anacharis*; **-Trumpet**, see *Cryptocoryne*; **-Violet**, see *Hottonia palustris*; **-weed**, see *Anacharis canadensis*; **-Willow**, see *Dianthera*.

Watsonia (Bugle Lily)—*Iridaceae*. Half-hardy summer-blooming bulbous plants. First introduced mid-eighteenth century.

OUTDOOR CULTURE: Soil, deep, rich, liberally manured. Position, sunny, sheltered, well-drained beds or borders. Plant, March to May. Place corms 4 in. deep and 6 in. apart in groups of three, six or twelve; put a little silver sand under each corm. Protect in winter with layer of manure. Apply liquid manure when flower buds form. Fix stakes to spikes when 2 or 3 in. high. Lift corms in Sept. and store in cool place till planting time.

POT CULTURE: Compost, two parts loam, one part well-decayed manure and river sand. Position, pots in cold frame, cool greenhouse or window. Pot, Oct. to March, placing five corms 1 in. deep in a 6 in. pot. Place pots in cold frame till flower spikes show, then remove to greenhouse or window. Water moderately at first, freely afterwards. Apply liquid manure when flower spikes show. After flowering gradually withhold water till foliage dies, then keep quite dry till repotted.

PROPAGATION: By seeds sown $\frac{1}{8}$ in. deep in pans of light, rich soil in Feb. in temp. 55° to 65°; bulbils planted 2 in. deep and 6 in. apart in sunny border outdoors, April.

SPECIES CULTIVATED: *W. angusta*, scarlet, to 4 ft., S. Africa; *coccinea*, scarlet, 1 ft., S. Africa; *densiflora*, rosy red, June, 1 ft., S. Africa; *Meriana*, pink, to 4 ft., S. Africa; *rosea*, rose, 3 to 6 ft., S. Africa.

Wattle, see *Acacia*.

Wax Plant, see *Hoya carnosa*.

Wayfaring Tree, see *Viburnum Lantana*.

Weeping Myall, see *Acacia pendula*.

Weigela—*Caprifoliaceae*. Hardy deciduous flowering shrubs, formerly included in *Diervilla*. First introduced early eighteenth century.

CULTURE: Any good garden soil with humus added to conserve moist root conditions. Mulch occasionally. Position, full sun or slight shade. Prune directly after flowering by shortening shoots that have borne flowers; no winter pruning required. For general cultivation the best value will be found among the numerous named hybrids, all grow to about 5 ft. with graceful arching branches.

PROPAGATION: By cuttings of young shoots in sandy soil under bell-glass or in cool greenhouse in spring; cuttings of firm shoots in north border under hand-light in Oct. or Nov.

SPECIES CULTIVATED: *W. coraeensis* (syn. *Diervilla grandiflora*), pale rose to carmine, June, glabrous branches and leaves, to 15 ft., Japan; *floribunda*, dark crimson, funnel-shaped, crowded on short branchlets, June, 6 to 10 ft., Japan;

florida (syn. *W. rosea*), rose, broadly funnel-shaped May, 6 to 8 ft., China; *hortensis*, carmine, bell-shaped, summer, 6 to 8 ft., Japan, var. *nivea*, white; *japonica*, pale rose, summer, 4 ft., Japan; *Middendorffiana*, sulphur-yellow, summer, 4 ft., Japan; *praecox*, earliest flowering species, rose colour, to 6 ft., Korea.

Weinmannia—*Cunoniaceae*. Slightly tender evergreen shrubs or trees with attractive fern-like foliage. First introduced early nineteenth century.

CULTURE: Soil, light, rich. Position, sheltered walls in southern counties, in the open in mildest areas, or well-drained borders in unheated greenhouse or conservatory. Plant, Sept. to Oct. or April to May. Water indoor plants freely during growing season.

PROPAGATION: By cuttings of half-ripened shoots in sandy soil under bell-glass in gentle bottom heat during July and Aug.

SPECIES CULTIVATED: *W. racemosa*, white or pink, June, 20 to 80 ft., New Zealand; *trichosperma*, creamy white, May to June, columnar habit, the hardier species, Chile. (Note: Heights given are for native countries, considerably less in Britain.)

Weldenia—*Commelinaceae*. Slightly tender herbaceous perennials.

CULTURE: Deep, well-drained loam, rather rich. Best grown in deep pots or pans in the alpine house or cold frame. Withhold water and plunge pots in dry peat or sand during winter. Water freely when growth commences in April.

PROPAGATION: By seeds. (These will be found at the base of the long flower tube, usually below ground level.)

SPECIES CULTIVATED: *W. candida*, white, May to July, 4 to 6 in., Mexico, Guatemala.

Wellingtonia, see *Sequoiadendron*.

Welsh Poppy, see *Meconopsis cambrica*.

Welwitschia—*Gnetaceae*. A curious hothouse plant of mushroom-like habit of growth with leaves fringed with ribbon-like filaments. A difficult plant to grow. First introduced mid-nineteenth century.

CULTURE: Equal parts brick rubble, loam and coarse sand. Avoid root disturbance at all times. Position, a well-drained bed in a hot, dry corner. Scarcely any water required. Full exposure to sun essential. Temp., 55° in winter, 75° in summer.

PROPAGATION: By imported seeds which are exceedingly difficult to obtain.

SPECIES CULTIVATED: *W. mirabilis*, Trop. Africa.

Westringia (Australian Rosemary)—*Labiatae*. Slightly tender evergreen flowering shrub. First introduced late eighteenth century.

CULTURE: Soil, light, rich loam. Position, sheltered shrubberies in southern gardens or unheated greenhouses and conservatories. Plant, Sept. to Oct. or April to May. Water indoor plants freely during the summer months.

PROPAGATION: By cuttings of half-ripened wood in shaded frame, Aug. to Sept.

SPECIES CULTIVATED: *W. rosmariniformis*, white, spotted purple, July to Aug., 3 to 5 ft., Australia.

Whin, see *Ulex*.

White Alder, see *Clethra*; **-beam**, see *Sorbus Aria*; **-Cedar**, see *Chamaecyparis thyoides*; **-Hellebore**, see *Veratrum album*; **-Lotus-of-the-Nile**, see *Nymphaea Lotus*; **-Mustard**, see *Brassica alba*.

Whitlow Grass, see *Draba verna*.

Whorl Flower, see *Morina longifolia*.

Whortleberry, see *Vaccinium myrtillus*.

Widdringtonia (African Cypress)—*Pinaceae* (or *Cupressaceae*). Tender evergreen coniferous trees, suitable only for greenhouse cultivation in this country. Habit, elegant and graceful. First introduced mid-eighteenth century.

CULTURE: Compost, two parts sandy loam and one part leaf-mould with a

liberal amount of silver sand. Position, pots in light, sunny greenhouse. Pot in March. Water freely March to Oct., moderately afterwards. Temp., March to Oct. 55° to 65°, Oct. to March 45° to 55°.

PROPAGATION: By seeds sown in gentle heat in spring, transferring seedling singly to small pots as soon as large enough to handle.

SPECIES CULTIVATED: *W. cupressoides*, to 12 ft., S. Africa; *juniperoides*, to 60 ft. S. Africa; *Whytei*, leaves glaucous and graceful, to 140 ft, Cent. Africa.

Wigandia—*Hydrophyllaceae*. Stove foliage plants with large, very wrinkled, more or less downy leaves. First introduced early nineteenth century.

CULTURE: Soil, ordinary. Position, sunny sheltered beds outdoors May to Oct., warm greenhouse remainder of year. Plant, May or June. Lift, Sept. or Oct.

PROPAGATION: By seeds sown in light soil in temp. 65° to 75° in Feb.; cuttings inserted in sandy soil under bell-glass in temp. 75° in spring. Usually treated as an annual; seldom preserved during the winter.

SPECIES CULTIVATED: *W. caracasana*, 8 to 10 ft., Mexico, and var. *imperialis*, vigorous; *Vigieri*, 4 to 6 ft., silvery foliage, origin uncertain.

Wild Coffee, see *Psychotria*; **-Rice**, see *Zizania*.

Willow, see *Salix*; **-Herb**, see *Epilobium*.

Windflower, see *Anemone*.

Windmill Palm, see *Trachycarpus Fortunei*.

Wine-Berry, see *Rubus phoenicolasius*; **-Palm**, see *Caryota urens*.

Winter Aconite, see *Eranthis hyemalis*; **-Cherry**, see *Physalis Alkekengi* and *Solanum Capsicastrum*; **-Cress**, see *Barbarea verna*; **-Daffodil**, see *Sternbergia lutea*; **-Green**, see *Gaultheria procumbens*; **-Heliotrope**, see *Petasites fragrans*; **-Savory**, see *Calamintha*; **-Sweet**, see *Acokanthera spectabilis* and *Chimonanthus praecox*.

Wire Vine, see *Muehlenbeckia complexa*.

Wisteria—*Leguminosae*. Hardy and slightly tender deciduous climbing flowering shrubs. Often, but not originally, spelt *Wistaria*. First introduced early eighteenth century.

CULTURE: Easily grown in ordinary soil, deep loam is best. Position, full sun essential. Walls with southern exposure, pergolas, arbours, trellis or scrambling over a tree. Easily trained as bush or standard. Plant, March or April. Prune, Jan. to March, shortening all young shoots not required for extending branches to within 1 in. of base. Do not prune those growing naturally over trees.

PROPAGATION: By layering young shoots, spring or summer.

SPECIES CULTIVATED: *W. floribunda*, violet-blue, spikes to 12 in. long, May to June, vigorous to 30 ft., Japan, with vars. *alba*, white flowered, *rosea*, pale rose, *macrobotrys* (syn. *W. multiflora*), flowers to 4 ft. long, *Russelliana*, flowers dark blue, and *violaceo-plena*, double violet flowers; *japonica*, cream, small, July, slender growth to 15 ft., rather tender, Japan; *sinensis*, 'Chinese Wisteria', deep lilac, spikes to 12 in., May to June, vigorous, 30 to 40 ft., very free-flowering and most popular form, China, with vars. *alba*, white-flowered, and *flore pleno*, double lilac flowers; *venusta*, white, May to June, rather tender, Japan.

Wych-Hazel, see *Hamamelis*.

Wolfberry, see *Symphoricarpos occidentalis*.

Wolfsbane, see *Aconitum lycoctonum*.

Wood Anemone, see *Anemone nemorosa*.

Woodbine, see *Lonicera Periclymenum*.

Woodruff, see *Asperula*.

Woodsia—*Polypodiaceae*. Greenhouse and hardy deciduous and evergreen ferns. Fronds, feather-shaped.

CULTURE OF GREENHOUSE SPECIES: Compost, equal parts peat and loam with little silver sand and charcoal. Position, well-drained pots or beds in shady greenhouse. Pot or plant, Feb. or March. Water freely March to Oct., moderately afterwards. Syringing not required. Shade from sun. Temp., Sept. to March 45° to 50°, March to Sept. 50° to 60°.

CULTURE OF HARDY SPECIES: Compost, equal parts peat and loam. Position, shady borders or banks. Plant, April. Water copiously in dry weather. All the hardy species are suitable for greenhouse culture.

PROPAGATION: By spores sown on surface of fine peat in well-drained pans placed in temp. of 75° at any time; division of plants, March or April.

GREENHOUSE SPECIES CULTIVATED: *W. obtusa*, 1 ft., N. America; *polystichioides*, 6 to 9 in., Japan.

HARDY SPECIES CULTIVATED: *W. alpina*, 6 in., N. Temp. Zone; *glabella*, 6 in., N. America; *ilvensis*, 4 in., Arctic and N. Temp. Zone (Br.); *scopulina*, 8 in., N. America.

Wood Sorrel, see *Oxalis*.

Woodwardia (Chain Fern)—*Polypodiaceae*. Greenhouse evergreen ferns. First introduced mid-eighteenth century.

CULTURE: Compost, equal parts loam and leaf-mould or peat. Position, in well-drained pots, or on rockeries in cool greenhouse or fernery. Water freely in summer, moderately other times. Syringe daily in summer. *W. radicans* and *W. radicans cristata* suitable for suspending in baskets. Greenhouse species will also grow outdoors in sheltered positions, and with the protection of litter in winter.

PROPAGATION: By spores sown on surface of fine peat in well-drained pans placed in temp. of 75° any time; division of plants, March or April; by bulbils removed from fronds and placed in small pots in temp. of 65° to 70° until roots form.

SPECIES CULTIVATED: *W. areolata*, 1 to 1½ ft., U.S.A.; *Harlandii*, 1½ ft., Hong Kong; *japonica*, 1½ to 2 ft., China and Japan; *radicans*, 3 to 8 ft., N. Temp. Zone, var. *orientalis* (syn. *W. orientalis*).

Wonga-wonga Vine, see *Pandorea pandorana*.

Wormwood, see *Artemisia Absinthium*.

Woundwort, see *Stachys* and *Anthyllis Vulneraria*.

Wulfenia—*Scrophulariaceae*. Hardy low herbaceous perennial herbs. First introduced early nineteenth century.

CULTURE: Soil, light, rich, sandy loam. Position, partially shady rockeries. Plant, March or April.

PROPAGATION: By seeds sown in light, sandy soil in shallow boxes in cold frame in March or April, transplanting seedlings when large enough to handle on to rockery; division of plants in March or April.

SPECIES CULTIVATED: *W. Amherstiana*, light blue, June to July, 9 to 12 in., Himalaya; *Baldaccii*, blue, summer, 9 in., Balkans; *carinthiaca*, blue, July, 1 ft., Carinthia.

Xanthisma—*Compositae*. Hardy annual. First introduced mid-nineteenth century.

CULTURE: Sow seeds in gentle heat in spring, harden off seedlings in May, and plant out in June, a foot apart, in bold groups in sunny borders.

SPECIES CULTIVATED: *X. texanum* (syn. *Centaureidium Drummondii*), yellow, summer, 2 to 4 ft., Texas.

Xanthoceras—*Sapindaceae*. Hardy deciduous flowering tree. First introduced mid-nineteenth century.

CULTURE: Soil, ordinary. Position, sheltered sunny borders or shrubberies in milder districts, against walls in southern counties. Plant, Oct. to Feb.

PROPAGATION: By seeds sown in light soil outdoors in autumn or spring, or by root cuttings inserted in pans of sandy soil in cool greenhouse in Feb. or March.

SPECIES CULTIVATED: *X. sorbifolium*, white, stained carmine, attractive, May, 10 to 20 ft., N. China.

Xanthorhiza—*Ranunculaceae*. Hardy deciduous flowering shrub. First introduced mid-eighteenth century.

CULTURE: Soil, moist loam. Position, thin woodlands or partially shady shrubberies. Plant, Nov. to Feb.

PROPAGATION: By division in Feb.

SPECIES CULTIVATED: *X. simplicissima* (syn. *X. apiifolia*), 'Yellow Root', purple, March to April, 1 to 2 ft., Eastern U.S.A.

Xanthosoma—*Araceae*. Stove perennial herbs with thick arrow-shaped leaves, grown in the tropics for the edible roots. First introduced early eighteenth century.

CULTURE: Compost, equal parts turfy loam, peat, leaf-mould and silver sand. Position, well-drained pots in shade. Pot moderately firmly in pots just large enough to take tubers in Feb. or March; transfer to larger pots in April or May. Water moderately Feb. to April and Sept. to Nov., freely April to Sept., keep quite dry Nov. to Feb. Temp., Feb. to Sept. 70° to 80°, Sept. to Nov. 65° to 75°, Nov. to Feb. 55° to 65°.

PROPAGATION: By dividing the tubers in Feb. or March.

SPECIES CULTIVATED: *X. atrovirens*, leaves dark green above, greyish beneath, Venezuela; *Lindenii* (syn. *Phyllotaenium Lindenii*), bright green leaves with white veins and midribs, Colombia; *violaceum*, leaves green with purplish veins, W. Indies.

Xeranthemum (Immortelle)—*Compositae*. Hardy annuals. Flowers, single and double; suitable for winter decoration. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Position, sunny beds or borders. Sow seeds in light soil in March in temp. 50° to 55°, planting out in June, or in open ground end of April. Gather flowers for winter decoration directly they are fully expanded.

SPECIES CULTIVATED: *X. annuum*, purple, etc., summer, 2 ft., S. Europe, and vars. *ligulosum* (syn. *X. imperiale*), double, and *perligulosum* (syn. *X. superbissimum*), very double.

Xerophyllum (Turkey's Beard)—*Liliaceae*. Hardy perennial subaquatic herb. First introduced mid-eighteenth century.

CULTURE: Soil, moist, sandy peat. Position, boggy places near the margins of ponds or lakes or damp spots in the wild garden. Plant, March or April.

PROPAGATION: By seeds sown in moist, peaty soil in April where required to grow or by division of roots in March or April.

SPECIES CULTIVATED: *X. asphodeloides*, white, May, 3 to 5 ft., N. America.

Xylobium—*Orchidaceae*. An epiphytic genus, scapes erect from base of the closely-set, rather small, pseudo-bulbs, which carry one or two hard-textured leaves, flowers often numerous but not large, and dull in colour.

CULTURE: Compost, as for *Maxillarias*, but include a little loam fibre. Pots well drained, water liberally in summer, intermittently in winter, judge by the texture of pseudo-bulbs and leaves, expose to light in autumn. Winter temp. 50° to 55°, in summer up to 75° to 80° by sun heat. Shading moderate.

PROPAGATION: By division of plants in spring.

SPECIES CULTIVATED: A selection—*X. bractescens*, fifteen to twenty-five, greenish-yellow, lip marked brown, floral bracts 1 to 2 in. long, summer, autumn, Peru; *concaum* (syn. *Maxillaria concaum*), small, pale yellow, mid-lobe of lip veined rose, spring, Guatemala; *elatum*, comparatively large, many, yellowish, red-brown, height 3 ft., spring, Peru; *hyacinthinum*, fifteen to twenty, fragrant, yellow, lip veined red, summer, Venezuela; *leontoglossum* (syn. *Maxillaria leontoglossa*), yellow, spotted red or purplish-red, mid-lobe of lip warted, summer, Colombia; *palmifolia*, ten to fifteen, yellowish, whitish, spring, W. Indies; *squalens*, fifteen to twenty-five, yellowish-white, often suffused brown-red, petals and lip dull purple, mid-lobe warted, summer, Venezuela.

Yam, see *Dioscorea*.

Yarrow, see *Achillea*.

Yellow Asphodel, see *Asphodeline lutea*; **-Centaury**, see *Blackstonia*; **-Flax**, see *Reinwardtia indica*; **-Root**, see *Xanthorrhiza simplicissima*; **-Star Flower**, see *Sternbergia lutea*; **-Star of Bethlehem**, see *Gagea silvatica*; **-Water Flag**, see *Iris Pseudacorus*; **-Water Lily**, see *Nuphar*; **-wood**, see *Cladrastis*; **-wort**, see *Blackstonia*.

Yrba Mansa, see *Anemopsis californica*.

Yew, see *Taxus*.

Youth-and-old-age, see *Zinnia elegans*.

Yucca—*Liliaceae* (or *Agavaceae*). Greenhouse and hardy evergreen shrubs or small trees with rosettes of sword-shaped leaves. First introduced late sixteenth century.

CULTURE OF HARDY SPECIES: Soil, ordinary light, well drained. Position, sunny banks, mounds, rockeries, raised borders, or as single specimens on lawns. Plant, Oct. or April. Protect in severe weather with mats in coldest districts.

CULTURE OF GREENHOUSE SPECIES: Compost, two parts sandy loam, one part leaf-mould, and little sand. Position, light greenhouse Sept. to June; sunny position outdoors, pots plunged to rims in soil, June to Sept; or may be grown entirely in greenhouse. Pot, March. Water freely April to Sept., very little afterwards. Repotting only necessary when root-bound. Temp., Sept. to March 40° to 50°, March to Sept. 55° to 65°.

PROPAGATION: By offsets or suckers in March or April; cuttings of roots inserted in sand in temp. 55° in spring.

GREENHOUSE SPECIES CULTIVATED: *Y. aloifolia*, 'Spanish Bayonet', creamy white, summer, 15 to 25 ft., Southern U.S.A. and W. Indies, and vars. *draconis*, leaves drooping, *quadricolor*, leaves reddish, *tricolor*, leaves variegated with white, green, and yellow, and *variegata*, leaves striped with white; *baccata*, creamy white, summer, to 3 ft., Colorado and Texas.

HARDY SPECIES CULTIVATED: *Y. filamentosa*, 'Adam's Needle', creamy, July to Aug., 3 to 6 ft., Southern U.S.A., and var. *variegata*, leaves variegated yellow or white; *flaccida*, creamy, July to Aug., 3 to 4 ft., South-eastern U.S.A., and vars. *integra*, smaller leaves, and *orchioides*, unbranched inflorescence; *glauca* (syn. *Y. angustifolia*), creamy, July, Southern U.S.A.; *gloriosa*, 'Spanish Dagger', creamy, July, 6 to 9 ft., not very free flowering, Southern U.S.A., and var. *nobilis*, with greyish leaves and flowers tinged red on outside; *recurvifolia*, leaves recurving, creamy, summer, to 6 ft., hardy and of easy culture, Southern U.S.A.

Yulan, see *Magnolia denudata*.

Zaluzianskya—*Scrophulariaceae*. Half-hardy annuals. First introduced mid-eighteenth century.

CULTURE: Soil, rich, sandy loam. Position, warm, sunny borders or rockeries.

PROPAGATION: By seeds sown on surface of fine light soil and lightly covered with silver sand and placed in temp. 55° in March, transplanting seedlings outdoors in June; or sow seeds $\frac{1}{8}$ in. deep outdoors in May where plants are required to flower. Water freely in dry weather. Mulch with layer of peat in June.

SPECIES CULTIVATED: *Z. capensis* (syn. *Nycterinia capensis*), white and purple, spring and summer, fragrant, 1 ft., S. Africa; *selaginoides* (syn. *Nycterinia selaginoides*), white and lilac, summer, 8 to 12 in., S. Africa.

Zamia—*Cycadaceae*. Stove or greenhouse evergreen palm-like plants with pinnate leaves. First introduced late seventeenth century.

CULTURE: Compost, equal parts loam and peat, little silver sand. Position, well-drained pots in shady part of stove. Pot, Feb. or March. Water copiously March to Oct. Syringe daily April to Sept. Moist atmosphere essential. Shade from sun. Temp., March to Oct. 70° to 75°, Oct. to March 55° to 60°.

PROPAGATION: By seeds sown in light soil in temp. 75° to 85°, spring; by offsets removed and placed in small pots under bell-glass in propagator in spring; by division, Feb. or March.

SPECIES CULTIVATED: *Z. furfuracea*, 'Jamaica Sago Tree', 3 ft., W. Indies; *integrifolia*, 3 ft., W. Indies; *Lindenii*, 8 ft., Ecuador; *Wallisii*, Colombia.

Zantedeschia (Arum or Calla Lily)—*Araceae*. Greenhouse rhizomatous perennials. First introduced early eighteenth century.

CULTURE OF Z. AETHIOPICA (ARUM LILY): Compost, equal parts loam, cow manure, and coarse silver sand. Position, greenhouse or dwelling-room Oct. to May; outdoors remainder of year. Repot annually in Aug. or Sept. Water moderately Sept. to March, freely March to May. Apply stimulants once a week during flowering period. Plant 15 in. apart in ordinary rich soil in sunny position outdoors in May, lift and repot in Aug. or Sept., singly in 5 or 6 in. pots. Supply freely with water in dry weather when outdoors. Suitable stimulants: $\frac{1}{2}$ oz. of Peruvian guano; 1 teaspoonful of Clay's fertiliser; or $\frac{1}{4}$ oz. nitrate of soda or sulphate of ammonia to 1 gall. of water. Temp., Sept. to March 40° to 55°, March to May 50° to 60°.

CULTURE OF OTHER SPECIES: Compost, same as for *Z. aethiopica*. Position, greenhouse Oct. to June; cold frame remainder of year. Repot annually in Feb. Water moderately Feb. to April and Aug. to Oct., freely April to Aug., keep nearly dry Oct. to Feb. Apply stimulants during flowering period. Temp., Oct. to March 55° to 65°, March to Oct. 65° to 75°.

PROPAGATION: By seeds sown $\frac{1}{2}$ in. deep in loam, leaf-mould and sand in temp. 65° to 75° in spring; division of plants when planting outdoors or repotting; suckers removed at potting time.

SPECIES CULTIVATED: *Z. aethiopica* (syn. *Richardia africana*), white, winter and spring, 3 to 4 ft., S. Africa; *albo-maculata*, yellow or milk-white, summer, 2 ft., leaves spotted white, S. Africa; *Elliottiana*, yellow, Aug., 3 ft., S. Africa; *melanoleuca*, yellow and purple, summer, 18 in., S. Africa; *Rehmannii*, rosy purple, summer, 2 ft., Natal.

Zanthorhiza, see Xanthorhiza.

Zanthoxylum—*Rutaceae*. Hardy deciduous prickly shrubs or trees with aromatic young branches, flowers insignificant. First introduced mid-eighteenth century.

CULTURE: Soil, deep, loamy. Position, open shrubberies, or as specimens on lawns. Plant, Nov. to Feb.

PROPAGATION: By seeds sown in cool greenhouse in Feb.; by cuttings of half-ripened shoots in July under bell-glass; by root cuttings in cool greenhouse in Feb.

SPECIES CULTIVATED: *Z. alatum*, yellowish, spring, to 12 ft., Himalaya; *americanum*, 'Prickly Ash', yellowish-green, spring, 10 to 25 ft., Eastern U.S.A.; *Clava-Herculis*, 'Toothache Tree', 'Hercules' Club', to 30 ft. or more, trunk and branches prickly, seeds black and shining, Southern N. America; *piperitum*, green, 10 to 20 ft., China and Japan; *simulans* (syn. *Z. Bungei*), handsome lustrous foliage, 6 to 8 ft., N. and Cent. China; *stenophyllum*, climbing 6 to 8 ft., W. China.

Zauschneria—*Onagraceae*. Half-hardy shrubby perennial. First introduced early nineteenth century.

CULTURE: Soil, sandy loam. Position, well-drained rockery or old wall. Plant, March or April.

PROPAGATION: By seeds sown in light, sandy soil, lightly covered with fine soil, March, transplant seedlings outdoors end of May or beginning of June; cuttings of young side shoots inserted in pots of sandy soil under bell-glass or hand-light in shady position outdoors in Sept., protecting cuttings in greenhouse until following April, then planting out; division of old plants in April.

SPECIES CULTIVATED: *Z. californica*, 'Californian Fuchsia', scarlet, autumn, 1 ft., California; *cana* (syn. *Z. microphylla*), scarlet, to 2½ ft., California.

Zea—*Gramineae*. Half-hardy annual. Leaves, narrow, grass-like; green or variegated with white. First introduced mid-sixteenth century.

CULTURE: Soil, ordinary. Sow seeds $\frac{1}{2}$ in deep and 1 in. apart in light, rich soil in well-drained pots or boxes in temp. 55° , March and April; transfer seedlings when 2 in. high singly into 2 in. pots, then into $4\frac{1}{2}$ in. pots. Place in cold frame to harden in May and plant outdoors in June. May also be grown in pots in compost of equal parts good loamy soil and leaf-mould and a little sand. Water freely.

SPECIES CULTIVATED: *Z. Mays*, 'Maize', 'Indian Corn', 3 to 12 ft., habitat uncertain, and vars. *everta*, 'Pop Corn', *gracillima*, dwarf, narrow-leaved, *japonica*, striped yellow, white, or pink, *japonica quadricolor*, striped, *japonica variegata*, variegated, and *rugosa* (syn. var. *saccharata*), 'Sweet Corn'.

Zebra Grass, see *Miscanthus sinensis* var. *zebrinus*; -**Plant**, see *Calathea zebrina*.

Zebrina—*Commelinaceae*. Greenhouse herbaceous trailing perennial with ornamental, oval-oblong leaves, dark green, striped white above, purplish beneath. Stems creeping. First introduced mid-nineteenth century.

CULTURE: Compost, equal parts loam, leaf-mould and sand. Position, in pots or baskets suspended from roof, or in beds under stage or on rockeries. Pot or plant, Jan. to April. Water freely March to Oct., moderately afterwards. Shade from strong sunshine. Temp., 40° to 50° Oct. to April, 55° to 65° April to Oct. May be grown in windows as a pot or basket plant. Protect from frost in winter.

PROPAGATION: By cuttings of young shoots inserted in light soil under bell-glass in above temp., March to Oct.

SPECIES CULTIVATED: *Z. pendula* (syn. *Tradescantia zebrina*), 'Wandering Jew', foliage striped white above, purple beneath, Mexico, and var. *quadricolor*, foliage striped with red and white.

Zelkova—*Ulmaceae*. Hardy deciduous trees.

CULTURE: Soil, deep, moist loam. Position, side of water-courses and in similar damp places. Plant, Oct. to Feb.

PROPAGATION: By seeds sown outdoors in autumn or spring; grafting in March.

SPECIES CULTIVATED: *Z. carpinifolia* (syn. *Z. crenata*), to 80 ft., Caucasus; *Serrata* (syn. *Z. acuminata*), to 100 ft., Japan.

Zenobia—*Ericaceae*. Hardy deciduous or half-hardy evergreen flowering shrub with attractive Lily of the Valley-like flowers. First introduced early nineteenth century.

CULTURE: Soil, peat or sandy loam, lime-free. Position, moist sheltered borders. Plant, Sept., Oct., March or April. Prune to prevent seed formation by cutting away, in early Aug., portions of shoots which have flowered.

PROPAGATION: By cuttings of half-ripe shoots inserted in sandy soil under bell-glass in gentle bottom heat during July.

SPECIES CULTIVATED: *Z. pulverulenta* (syns. *Z. speciosa*, *Andromeda pulverulenta*), white, waxy, June to July, fragrant, greyish-white foliage, 4 to 6 ft., N. Carolina to Florida, and var. *nuda*, leaves green, flowers smaller.

Zephyranthes (Zephyr Lily; Flower of the West Wind)—*Amaryllidaceae*. Hardy and half-hardy bulbous flowering plants. First introduced early seventeenth century.

CULTURE OF HARDY SPECIES: Soil, light, sandy loam. Position, well-drained sunny beds, borders or rockeries. Plant, Aug. to Nov., placing bulbs 3 to 4 in. deep and 4 in. apart. Protect in winter by a layer of cinder ashes. Lift and replant only when bulbs show signs of deterioration.

CULTURE OF HALF-HARDY SPECIES: Compost, two parts loam, one part peat, leaf-mould and silver sand. Position, well-drained pots in cold frame or greenhouse. Pot, Aug. to Nov., placing one bulb 2 in. deep in a 5 or 6 in. pot. Water very little till growth begins, then freely. Withhold water when flowers fade and keep soil quite dry till potting time.

PROPAGATION: By offsets, planted and treated as advised for large bulbs, Aug. to Nov.

HALF-HARDY SPECIES CULTIVATED: *Z. Atamasco*, 'Atamasco Lily', white,

tinged purple, May, 1 ft., N. America; *grandiflora* (syn. *Z. carinata*), pink, summer, 6 to 12 in., Cent. America and W. Indies.

HARDY SPECIES CULTIVATED: *Z. candida*, white, Sept., 6 to 12 in., La Plata.

Zingiber (Ginger)—*Zingiberaceae*. Stove perennial. Roots furnish the ginger of commerce. First introduced early seventeenth century.

CULTURE: Compost, equal parts loam, peat and sand. Position, pots in shady, moist part of stove. Pot, Feb. Water copiously March to Oct., keep nearly dry Oct. to March. Temp., March to Oct. 75° to 85°, Oct. to March 55° to 65°. Stems die down in autumn.

PROPAGATION: By division of the rhizomes in Feb.

SPECIES CULTIVATED: *Z. officinale*, yellowish-green and purple, July, to 3 ft., Trop. Asia.

Zinnia (Youth-and-old-age)—*Compositae*. Half-hardy annuals. First introduced mid-eighteenth century.

CULTURE: Soil, deep, loamy, liberally enriched with decayed manure. Position, sunny beds or borders. Sow seeds $\frac{1}{16}$ in. deep in light soil in temp. 55° early in April. Transplant seedlings when third leaf forms 2 in. apart in shallow boxes filled with loamy soil. Place box near the glass in temp. 55° until seedlings are established, then remove to a cooler house, and if possible plant out 4 in. apart in good rich soil in cold frame early in May. Shade from sun, keep moist, and gradually expose to air, end of month. Plant out 8 to 12 in. apart, second week in June. Sow also outdoors, middle of May. Prepare bed of rich soil in sunny position, sow three or four seeds at intervals of 12 in., and thin seedlings to one at each place when third leaf forms. Mulch all zinnias with decayed manure after planting. Water liberally in dry weather. Apply stimulants when the plants commence to flower. On dry soils take out soil to depth of 12 in., put 3 in. of decayed manure in, then replace soil.

SPECIES CULTIVATED: *Z. elegans*, various colours, summer, 2 to 3 ft., Mexico; *Haageana*, orange-scarlet, summer, 1 ft., Trop. America; *linearis*, golden yellow, summer, 9 to 12 in., Mexico; *pauciflora*, yellow or purple, summer, 1 ft., Mexico; *tenuiflora* (syn. *Z. multiflora*), scarlet, summer, 2 ft., Mexico.

Zizania (Canadian Wild Rice)—*Gramineae*. Hardy aquatic grass. First introduced late nineteenth century.

CULTURE: Soil, ordinary. Position, margins of shallow ponds or lakes. Plant, April or May.

PROPAGATION: By seeds sown in heat in spring, growing seedlings on under glass until May, then hardening off in cold frame.

SPECIES CULTIVATED: *Z. aquatica*, 'Water Rice', 'Water Oats', green and brown, summer, 6 to 10 ft., N. America.

Zizyphus (Jujube)—*Rhamnaceae*. Slightly tender deciduous small tree. Cultivated in Medit. region for the production of jujube fruits. First introduced mid-seventeenth century.

CULTURE: Soil, good loamy. Position, sheltered and sunny. Plant, Nov. to Feb.

PROPAGATION: By seeds stratified and sown the following spring; cuttings of the roots in cool greenhouse in Feb.

SPECIES CULTIVATED: *Z. Jujuba* (syn. *Z. sativa*), yellowish, fruits dark red, to 30 ft., branches spiny, S.E. Europe to China.

Zigadenus—*Liliaceae*. Hardy herbaceous plants with or without bulbs. First introduced mid-eighteenth century.

CULTURE: Soil, peat, leaf-mould and sand. Position, partially shady, moist border or bed. Plant, autumn. Lift and replant triennially.

PROPAGATION: By division of offsets in autumn; seeds sown in sandy soil in a cold frame in spring.

SPECIES CULTIVATED: *Z. angustifolius*, white and purple, June, 18 in., N.

America; *elegans*, green and white, July, 2 to 3 ft., N. America; *glaberrimus*, white, July, 2 to 3 ft., N. America; *Nuttallii*, white, June, 18 in., N. America.

Zygocactus (Leaf-flowering Cactus)—*Cactaceae*. Succulent greenhouse plants. First introduced, under the generic name *Epiphyllum*, early nineteenth century.

CULTURE: Compost, equal parts turfy loam, peat and leaf-mould, with silver sand and broken brick added. Position, light, warm greenhouse Sept. to June; sunny place outdoors or cold frame June to Sept. Water moderately Sept. to April, little more freely other times. Temp., Nov. to March 50° to 60°, March to June 55° to 65°, Sept. to Nov. 40° to 45°.

PROPAGATION: By cuttings inserted singly in 3 in. pots filled with sandy soil and brick dust in March or April; grafting on *Pereskia aculeata* or *P. Bleo* in temp. 65° to 75° in spring.

SPECIES CULTIVATED: *Z. truncatus*, 'Crab Cactus', 'Christmas Cactus', rosy red, Brazil.

× **Zygocolax**—*Orchidaceae*. Bigeneric hybrid between *Zygopetalum* and *Colax*, intermediate between the two in habit and floral characters.

Zygopetalum—*Orchidaceae*. An epiphytic genus which has been much confused through the inclusion of allied genera. True *Zygopetalums* have decided pseudo-bulbs carrying two to three leaves. The scapes, often tall with several flowers, are produced from the base of the pseudo-bulb, often with the young growths. Flowers fairly large, attractive, lip has a transverse crest. Some species are terrestrial in suitable environments. In a few the habit is scandent and the pseudo-bulbs are carried at intervals.

CULTURE: Compost, two parts loam fibre, two parts peat or osmunda fibre, one part sphagnum moss with finely broken crocks and a few decayed leaves. Well-drained pots for the majority; species with creeping stems should be placed in shallow baskets on rafts or tree fern stem, very little, if any, loam included in the compost for them. The Odontoglossum House is suitable for many during summer but the winter temp. should be 55° to 60°, as a dry atmosphere is inimical. Water liberally in summer, infrequently in winter, but guided by the state of the plant and pipe heat.

PROPAGATION: By division of the plants in spring, if large enough.

SPECIES CULTIVATED: *Z. Burkei*, three to eight, green, lined dark brown, lip white, crest ribbed purple-violet, winter, British Guiana; *coeleste*, blue-violet, yellow on lip, summer, without pseudo-bulb, Colombia; *intermedium*, four to ten yellowish-green, flushed or blotched red-brown, lip spreading, whitish with radiating lines and spots of violet-purple, very fine, autumn, Brazil; *Mackayi*, five to seven, fragrant, yellowish-green, blotched chestnut or purplish-brown, lip whitish with radiating lines of purple-violet, crest two-lobed, autumn to winter, Brazil; *maxillare*, five to eight, green blotched and barred chocolate-brown, lip violet-blue, crest darker, creeping, summer, various, Brazil, var. *Gautieri*, larger lip often spotted blue, crest purple.

SUPPLEMENT

Abies nobilis, up to 250 ft., Washington to California. See p. 1.

Aechmea marmorata, leaves marked brown, violet-blue flowers, greenhouse or room plant, Brazil. For culture see p. 11.

Agapetes—*Ericaceae*. Warm greenhouse evergreen flowering shrubs.

CULTURE: Compost, equal parts acid loam, peat and sand. Position, warm moist greenhouse with light shade in summer. Temp., Sept. to March 55° to 60°, March to Sept. 60° to 70°.

PROPAGATION: By cuttings of firm shoots in sandy soil in a propagating case with temp. of 65° to 70°.

SPECIES CULTIVATED: *A. macrantha*, fl. white, yellow and red, December, Nepal; *serpens* (syn. *Pentapterygium serpens*), fls. red with deeper markings, W. China.

Aloe plicatilis, greyish leaves, red flowers, greenhouse or room plant, Cape Province. For culture see p. 20.

Alsine verna, see *Arenaria verna*, p. 39.

Anemopaegma—*Bignoniaceae*. Warm greenhouse climber.

CULTURE: Compost, fibrous loam, decayed manure and sand. Plant in borders or large tubs with stems trained up greenhouse roof. Thin out the growths in summer and each spring cut back side growths. Temp., March to Oct. 60° to 75°, Oct. to March 55° to 60°.

PROPAGATION: By seed sown in pots of sandy soil in temp. 60° to 75°; cuttings of young shoots taken in late spring in sandy soil in a heated propagating case.

SPECIES CULTIVATED: *A. chamberlaynii*, yellow, Sept., Brazil.

Apricot, see *Prunus*, pp. 399 to 402.

Arabis albida (syn. *A. caucasica*), white, Jan. to May, 6 to 9 in., S.E. Europe; *flore-pleno*, double white or tinged pink; *variegata*, leaves variegated yellow. For culture see p. 36.

Bertholletia—*Lecythidaceae*. Tropical trees producing Brazil and Para nuts but of no ornamental value.

SPECIES CULTIVATED: *B. excelsa*, *B. nobilis*, S. America.

Blue-Eyed Grass, see *Sisyrinchium angustifolium*, p. 457.

Chionodoxa gigantea, violet-blue flowers, Asia Minor; there are also white and pink forms. For culture see p. 107.

Cinnamon Vine, see *Dioscorea batatas*, p. 165.

Cissus sicyoides, *C. striata*; popular green-foliaged room or greenhouse plants. For culture see p. 114.

Crassula perfoliata; white or red flowers, Cape Province; popular greenhouse or room plant. For culture see p. 133.

Cryptanthus undulatus, small, ornamental leaves, Brazil; popular room or greenhouse plant. For culture see p. 136.

Cyclamen neapolitanum, hardy, rose, July to Nov., Medit. Region; var. *album*, white-fl.; *roseum*, rose-fl. For culture see p. 142.

Cyperus diffusus, 1 to 2 ft., Tropics: popular greenhouse or room plant. For culture see p. 145.

Daphne odora, evergreen, to 6 ft., reddish purple, fragrant fls., Jan. to March, China, Japan; not fully hardy. For culture see p. 150.

Doxantha capreolata, (syn. *Bignonia capreolata*, *Anisostichus capreolatus*); see p. 30.

Endymion nonscriptus, 'Bluebell'; *E. hispanicus*, latest botanical names for *Scilla nonscripta* and *S. hispanica*; see p. 447.

Fatshedera—*Araliaceae*. Evergreen, hardy shrub, popular as room plant. A bi-generic hybrid between *fatsia* and *hedera*.

CULTURE: Out of doors, well drained soil, shady position. Indoors, pot in a mixture of equal parts loam peat or sand; water freely in summer, sparingly in winter.

PROPAGATION: Cuttings root readily in sandy soil in spring and summer.

SPECIES CULTIVATED: *F. lizei*, dark green leaves, France; there is a variegated form.

Ficus benjamina, *F. heterophylla*, popular green-foliaged room or greenhouse plants. For culture see p. 195.

Four o'clock Plant, also known as Marvel of Peru, see *Mirabilis jalapa*, p. 313.

Gentiana macaulayi, deep blue, 2½ in., Sept. to Oct., garden origin (*G. areri* × *G. sino-ornata*) see p. 206.

Gherkin, see *Cucumis*, p. 137.

Ghost Tree, see *Davidia involucrata*, p. 153.

Handkerchief Tree, see *Davidia involucrata*, p. 153.

Helianthus multiflorus, see *Helianthus decapetalus*, p. 224.

Helleborus corsicus, yellowish green, March to April, 1½ ft., Corsica, Sardinia. For culture see p. 227.

Himalayan Blackberry, see *Rubus procerus*, p. 429.

Ixora fulgens, orange red, 3 to 4 ft., Java. For culture see p. 252.

Leptosiphon, see *Gilia*, p. 209.

Litchi (Lychee, Lecchee)—*Sapindaceae*. Tender, evergreen tree grown in warm regions for edible fruits.

CULTURE: Small plants can be grown in rooms or a frost-proof greenhouse for ornament. Compost, equal parts loam, peat and sand.

PROPAGATION: By seed sown in spring or summer in a warm greenhouse.

SPECIES CULTIVATED: *L. chinensis*, 30 to 40 ft., China.

Lysichitum (Skunk Cabbage)—*Araceae*. Hardy perennial waterside plants.

CULTURE: Wet, marshy soil. Position, edges of streams or pools. Plant in early spring.

PROPAGATION: By division in spring. *L. americanum* by seed.

SPECIES CULTIVATED: *L. americanum*, yellow spathes, April 1 to 2½ ft., N. America; *camtschatcense*, spathes white, May, Japan.

Madonna Lily, see *Lilium candidum*, pp. 275 to 276.

Mangifera (Mango)—*Anacardiaceae*. Stove evergreen trees. Grown in the tropics for edible fruits.

CULTURE: Compost equal parts loam, peat and sand. Temp. Sept. to March 55° to 60°, March to Sept. 60° to 75°.

PROPAGATION: By seeds or cuttings in a heated propagating case.

SPECIES CULTIVATED: *M. indica*, 60 ft., E. Indies, Malaya.

Mango, see *Mangifera*, p. 526.

Metasequoia—*Pinaceae*. Hardy deciduous conifer.

CULTURE: Soil, ordinary. Plant Oct. to Feb.

PROPAGATION: By seed or cuttings taken in late summer in a propagating case with a temp. of 65° to 70°.

SPECIES CULTIVATED: *M. glyptostroboides*, 115 ft., China.

Mimulus glutinosus (syn. *Diplacus glutinosus*), fls. orange, crimson, to 5 ft., California. For culture see p. 313.

Mind-Your-Own-Business, see *Helxine solierolli*, p. 227.

Monarch of the East, see *Sauromatum*, p. 440.

Myrobalan Plum, see *Prunus cerasifera*, p. 402.

Neanthe—*Palmaceae*. Greenhouse or room palm.

CULTURE: Compost, peat, sand and loam in equal parts. Pot March. Water moderately Sept. to March, freely afterwards. Feed occasionally in summer. Temp. Sept. to March 50° to 60°, March to Sept. 60° to 70°.

PROPAGATION: By seeds sown in spring or summer in a heated greenhouse.

SPECIES CULTIVATED: *N. elegans* (syn. *Chamaedorea elegans*, *C. pulchella*, *Collinia elegans*) 4 ft., Mexico.

Nepeta hederacea, see *Glechoma hederacea*, p. 210.

Nidularium rutilans, vermilion-red fls., spotted leaves, Brazil. For culture see p. 328.

Pentapterygium, see *Agapetes*, p. 525.

Peperomia caperata, leaves small, white flowers, Brazil; *glabella*, leaves green, trailing, Cent. America; *hederaceaefolia*, leaves marked silver, Brazil; *magnoliaefolia*, leaves pale green and cream, W. Indies; *microphylla*, leaves small, trailing, Mexico; *sandersii*, rounded leaves with silver markings, Brazil; *scandens*, leaves marked white, Peru. For culture see p. 363.

Philodendron bipinnatifidum, leaves green, indented, Brazil; *erubescens*, leaves bronzy-green, red beneath, Colombia; *fenzlii*, leaves green, three-lobed, Mexico; *leichtlinii*, leaves green, perforated; *oxycardium*, leaves green, heart-shaped, C. America; *pinnatifidum*, leaves green, indented, S. America; *scandens*, leaves green, heart-shaped, C. America; *selloum*, leaves green, indented, Brazil; *wendlandii*, leaves green, glossy, C. America. For culture see p. 371.

Phuopsis stylosa, see *Crucianella stylosa*, p. 136.

Pilea cadierei, ornamental leaves, silver markings, Vietnam. For culture see p. 378.

Primula edgeworthii (syn. *P. winteri*), pale mauve, April, W. Himalaya; *alba*, white flowers. For culture see p. 396.

Prunus—*Rosaceae*.

CULTURE OF PLUMS: Can be grown as fan-trained trees on walls and as standards or half-standards in the open. Rootstocks, common plum (partially dwarfing), common mussel (partially dwarfing), Brompton (vigorous) Myrobalan B (vigorous). Plant fan-trained trees 15 to 18 ft. apart; standards and half-standards 15 to 20 ft. apart. Good, well-drained soil needed and trees are best grown in cultivated ground. Feed each spring with $\frac{1}{2}$ oz. sulphate of ammonia and $\frac{1}{2}$ oz. sulphate of potash per sq. yd. Apply superphosphate of lime at 2 oz. per sq. yd. only every 2 to 3 years. Mulch around trees each spring with farmyard manure, compost or moist peat. Trees in the open, once the framework of branches is formed, should be pruned as little as possible. None should be done in the winter owing to the risk of infection from the silver leaf fungus disease. Prune only in

spring or before the end of the summer when wounds heal quickly. Cut out dead and diseased wood and thin overcrowded growths. The pruning of established fan-trained trees is done in the summer. Young shoots growing towards or away from the wall should be rubbed out. New shoots can be allowed to extend the framework of the tree and to fill bare spaces but other new side growths should have their tips pinched out when they have made about 6 leaves. These should be shortened by about half their length after picking the fruit. Plums are prone to suckering and these should be torn from their point of origin and not cut off—this will encourage more suckers to appear.

CULTURE OF CHERRIES: Fan-trained trees can be grown on walls (the acid Morello cherry does well on a North facing wall) or as standard trees in the open. Rootstocks, the Malling selection F12/1 can be used for all cherries. Plant fan-trained trees 18–24 ft. apart. Standard trees need to be spaced 30 to 40 ft. apart and are not suitable for small gardens. Good deep soil that is well drained is required; trees will not succeed in heavy, wet ground. Feed sweet cherries with $\frac{1}{2}$ oz. sulphate of potash each spring and give a mulch of rooted manure or compost. Nitrogenous manures, such as sulphate of ammonia, will stimulate growth too much, and should only be given if growth is weak. Superphosphate of lime can be applied every 2 or 3 years at $1\frac{1}{2}$ oz. per sq. yd. Feed acid cherries similarly to plums. Prune standard sweet cherries as for standard plums. Sweet cherries, trained as fans, are spur pruned in a similar manner to fan-trained plums. Acid cherries, trained as fan trees, are pruned similarly to peaches (p. 400). Standard acid cherries can be pruned in the spring by thinning out some of the older growths to encourage plenty of young shoots. It should be borne in mind that acid cherries fruit on growths made in the previous season, whereas sweet cherries produce fruit on young and old wood. Over vigorous trees growing against walls can be root-pruned in winter.

Pteris biaurita argyraea, 'Silver Fern' (syn. *P. quadriaurita argyraea*), white-lined fronds, 3 ft., Central India; *P.b. tricolor*, fronds red with silver lines. For culture see p. 404.

Pussy Willow, see *Salix discolor*, p. 434.

Puya—*Bromeliaceae*. Warm and cool greenhouse perennials.

CULTURE: Compost, equal parts fibrous loam, peat and coarse sand. Pot, March, good drainage essential. Most species require a minimum winter temperature of 55° but *P. alpestris* is almost hardy and will succeed in a frost-proof greenhouse.

PROPAGATION: by seed or suckers removed from established plants.

SPECIES CULTIVATED: *P. alpestris*, metallic blue fls. 2 to 3 ft., Chile; *P. chilensis*, greenish-yellow fls., July, 2 to 3 ft., Chile.

Redcurrant, see *ribes*, p. 420.

Rhoicissus—*Vitaceae*. Evergreen climber for warm greenhouse or room.

CULTURE: Compost, equal parts loam peat and sand. Pot in spring and feed occasionally in summer with liquid fertiliser. Train shoots to supports. Temp., Oct. to April 45° to 55° , April to Oct. 55° to 65° .

PROPAGATION: Cuttings in spring in a heated propagating case or by layering.

SPECIES CULTIVATED: *R. rhomboidea* (syn. *Cissus rhomboidea*), small glossy green leaves, Natal.

Rhus cotinus, see *Cotinus coggygia*, p. 131.

Rock Rose, see *Cistus*, p. 114.

Schefflera (Umbrella Tree)—*Araliaceae*. Evergreen tree or plant for warm greenhouse or room.

CULTURE: Compost equal parts loam, peat and coarse sand. Pot in spring, feed in summer with liquid fertiliser. Light shade needed from strong sunshine.

Temp. Oct. to April 55° to 65°, April to Oct. 60° to 70°.

PROPAGATION: Stem cuttings in propagating case, temp. 65° to 70°.

SPECIES CULTIVATED: *S. actinophylla*, large ornamental leaves, Australia.

Schinus (Christmas Berry Tree)—*Anacardiaceae*. Evergreen, greenhouse tree.

CULTURE: Compost, equal parts loam, peat and coarse sand. Temp. Oct. to April 45° to 55°, April to Oct. 60° to 70°.

PROPAGATION: By seeds.

SPECIES CULTIVATED: *S. terebinthifolius*, fls. white, berries red, 20 ft., S. America.

Setcreasea—*Commelinaceae*. Perennials with ornamental leaves for warm greenhouse or room.

CULTURE: Compost, equal parts fibrous loam, peat and sand. Pot in spring and grow in warm, light position. Temp. Oct. to April 55° to 60°, April to Oct. 60° to 70°.

PROPAGATION: By cuttings of shoots in a warm propagating case.

SPECIES CULTIVATED: *S. striata*, olive-green leaves with white stripes; *purpurea*, 'Purple Heart', rosy-purple leaves, Mexico.

Spathiphyllum wallisii, popular room plant with ornamental leaves and flowers. For culture see p. 465.

Skunk Cabbage, see *Lysichitum*, p. 526.

Syngonium (Goosefoot) *Araceae*. Greenhouse or room evergreen climbers.

CULTURE: Compost, equal parts loam, peat and coarse sand. Moist atmosphere needed in summer. Temp. Oct. to March 55° to 60°, March to Oct. 60° to 75°.

PROPAGATION: By cuttings of shoots in heated propagating case.

SPECIES CULTIVATED: *S. podophyllum*, C. America; *vellozianum*, Brazil.

Tacsonia, see *Passiflora*, p. 356.

Tiger Lily, see *Lilium tigrinum*, p. 277.

Tradescantia blossfeldiana, green and purple leaves, warm greenhouse or room plant, Argentine. For culture see p. 491.

Tree Fern, see *Dicksonia*, p. 161.

Venidio-Arctotis. A name applied to some hybrids between *Arctotis grandis* and *A. speciosa* in which chance crossing with *Venidium fastuosum* is also believed to have played a part. The flowers resemble those of *arctotis*, are in many shades of wine, crimson, rose and orange and, as they are almost completely sterile, must be increased by cuttings. These are taken at any time in summer and rooted in a frame or cool greenhouse in which the plants should also be overwintered. Plant out in May in a sunny, open situation and well-drained soil.

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of common and catalogue names*

BY A. G. L. HELLYER

F.L.S., A.H.R.H.S.,

Editor of 'Amateur Gardening'

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UNIFORM WITH THIS BOOK

Sanders' Encyclopaedia of Gardening
The Encyclopaedia of Garden Work and Terms
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FOREWORD

‘I CAN never remember the names of plants. Show me a picture and I will tell you whether it is the one I mean.’ How often I have heard that request or something like it. The demand for a picture book of garden flowers is very widespread and very real, and it is for these reasons I have prepared the present volume.

Though it contains over 1100 individual portraits, it cannot possibly show all the ornamental plants that may be found in gardens, for a modest estimate puts these at more than twenty times that number, without allowing for the vast numbers of varieties of popular plants, such as roses, dahlias and chrysanthemums. What I have tried to do, therefore, is to give as representative a selection as possible so that, even though the particular species for which search is being made cannot be found, another similar plant of the same genus will assist the reader in making an identification.

Though *Plant Portraits* is primarily intended as a companion volume to Sander’s *Encyclopaedia of Gardening*, in which all these plants and many more are described, and which gives detailed particulars of their cultivation, nevertheless it can be used as a reference book by itself if so desired. Beneath each picture sufficient information is given to enable the reader to know the colour and height of the plant, its time of flowering and the class to which it belongs (i.e. annual, hardy herbaceous perennial, shrub, etc.), and in many instances this will be all that he requires.

The pictures have been arranged alphabetically according to their botanical names, as these are the only names which have universal validity. Popular names, though often charming, are seldom sufficiently precise to permit accurate designation, and they have an exasperating habit of varying from one place to another.

Unfortunately botanical names are also subject to occasional change, though this is not made capriciously, but according to certain well-defined rules, and always as a result of an increase in knowledge about the plant in question. Nevertheless, because of such changes, differences will be found between one reference work and

another. In this instance I have followed the nomenclature adopted in Sander's *Encyclopaedia of Gardening*, which was itself the latest and most reliable nomenclature I could ascertain when that book was revised and republished in 1952.

For the benefit of readers who know the popular but not the botanical name of a particular plant I have included a comprehensive index of popular names with the appropriate cross-references. In this index I have also included some outdated botanical names which are still commonly used in nursery catalogues and are often the only reference to the plant which the gardener possesses. I hope that this system of arrangement will make the book easy to use by both the beginner and the expert.

I am greatly indebted to Mr. W. M. Campbell, Curator of the Royal Botanic Gardens, Kew, for the great trouble which he and his assistants have taken in providing material for photography without which this book could not have been completed in its present comprehensive form. Some photographs have also been taken in the Wisley gardens of the Royal Horticultural Society to whom I am also indebted.

Mr. W. T. Stearn of the Natural History Department, British Museum, has very kindly looked through the proofs and made numerous helpful suggestions which have been of the greatest assistance.

It is my sincere hope that *Plant Portraits* will help many gardeners to acquire a greater knowledge of plants and will increase their pleasure in gardening.

ROWFANT 1953

A. G. L. HELLYER

ENCYCLOPAEDIA



Abelia floribunda. Slightly tender shrub, rosy-purple flowers, June. 6 ft.



Abies georgei. Hardy conifer. 40-70 ft.



Abies grandis. Hardy conifer. 200-300 ft.



Abutilon hybridum savitzii. Half-hardy perennial, coloured foliage. 4-5 ft.



Abutilon megapotamicum. Greenhouse shrub, yellow and scarlet flowers, summer. 4-8 ft.



Acacia armata (Kangaroo Thorn). Greenhouse shrub, yellow flowers, spring. 10 ft.



Acacia decurrens (Mimosa). Greenhouse shrub, yellow flowers, early spring. 6-50 ft.



Acaena microphylla. Hardy creeping perennial, crimson burrs, summer.



Acalypha hispida (Red Hot Cat Tail). Greenhouse foliage plant, red spikes, summer. 6-10 ft.



Acantholimon glumaceum (Prickly Thrift). Hardy perennial, pink flowers, July. 6-9 in.



Acanthus spinosus. Hardy perennial, purple flowers, July. 2-4 ft.



Acer griseum (Maple). Hardy tree, dark-coloured bark peeling to reveal orange underneath. 40 ft.



Acer palmatum (Japanese Maple). Hardy tree, variously coloured leaves. 10-20 ft.



Achillea clavennae (Yarrow). Hardy perennial, white flowers, summer. 6 in.



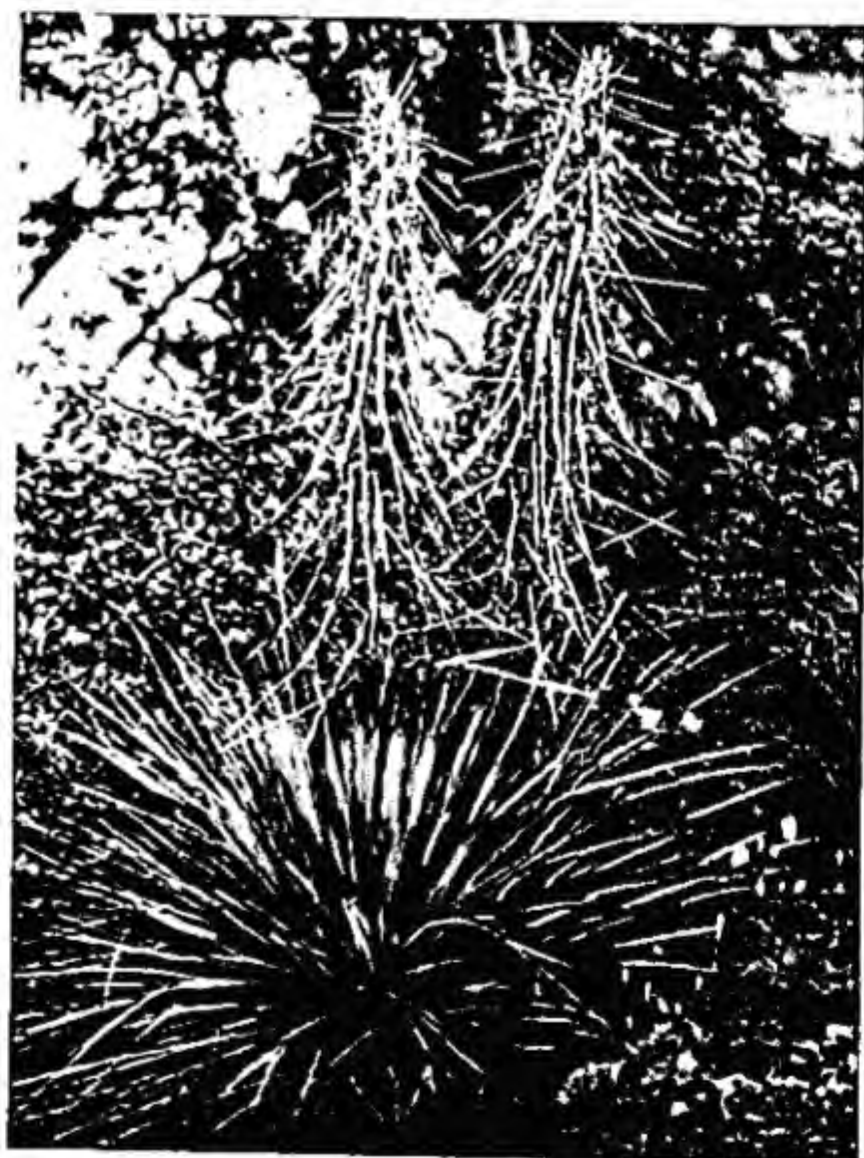
Achillea filipendula (Yarrow). Hardy perennial, yellow flowers, June to September. 4-5 ft.



Achiemenes hybrida. Greenhouse perennial, scarlet flowers, summer. 1 ft.



Acidanthera bicolor murielae. Half-hardy bulb, white crimson-blotched flowers, July. 3 ft.



Aciphylla squarrosa (Bayonet Plant). Hardy perennial white flowers, summer. 4-6 ft.



Aconitum cammarum bicolor. Hardy perennial, purple and white flowers, summer. 4-6 ft.



Acorus calamus variegatus (Sweet Flag). Hardy aquatic, cream- and green-striped leaves. 2 ft.



Acrostichum danaeifolium. Stove evergreen fern, erect fronds. 5 ft.



Actaea spicata (Herb Christopher). Hardy perennial, white flowers, May, black berries. 1 ft.



Actinidia chinensis. Hardy climber, white flowers, June. 15-20 ft.



Ada aurantiaca. Epiphytic orchid, orange flowers, January. 1 ft.



Adenandra uniflora. Greenhouse shrub, white and pink flowers, June. 1½ ft.



Adiantum capillus-veneris (*Maidenhair Fern*). *Greenhouse fern*. 4-6 in.



Adiantum pedatum (*Hardy Maidenhair Fern*).
Hardy fern. 1-3 ft.



Adiantum tenerum farleyense (*Maidenhair Fern*). *Stove fern*. 3 ft.



Adonis pyrenaica. Hardy perennial, yellow flowers, July. 1 ft.



Aechmea fulgens. Stove evergreen plant, scarlet and purple flowers, June. 1 ft.



Aerides lawrenceae sanderianum. Epiphytic orchid, creamy-white, tipped magenta flowers, autumn. 1-4 ft.



Aesculus indica. Hardy tree, white, yellow- and red-blotched flowers, June and July. 100 ft.



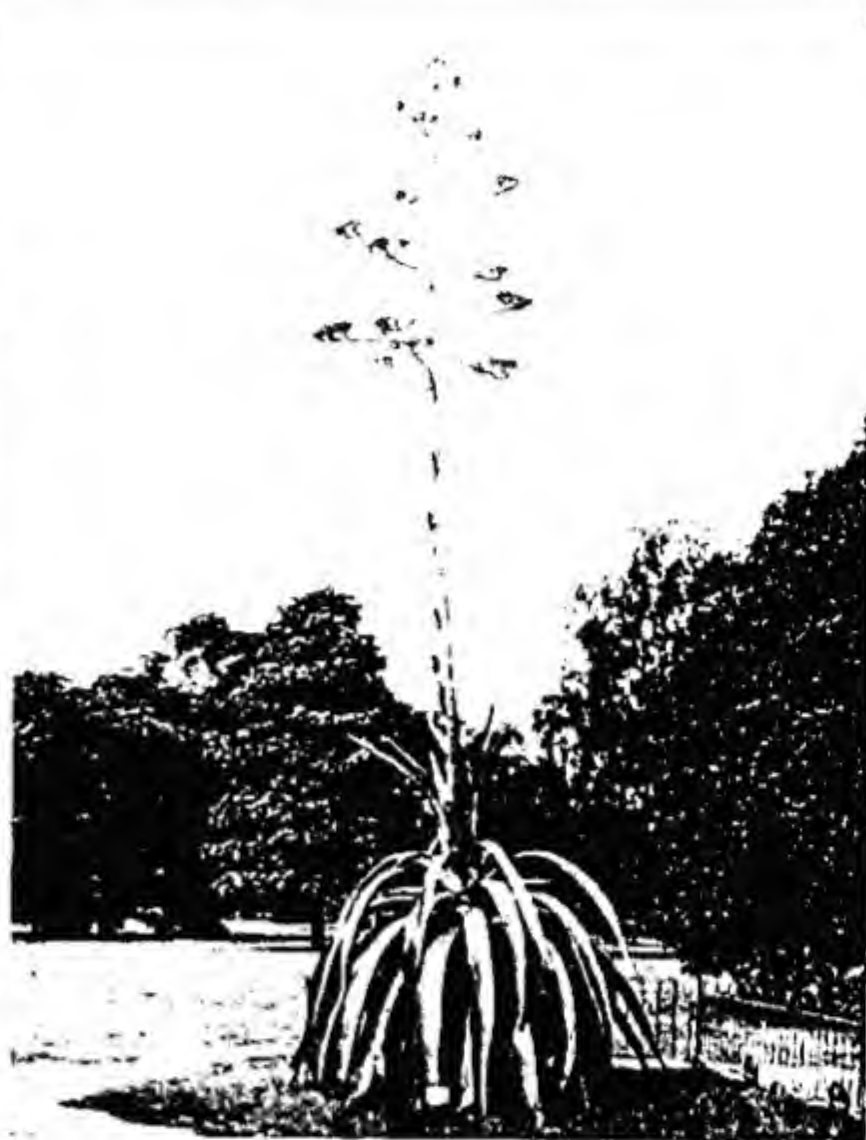
Aesculus parviflora (Dwarf Buckeye). Hardy shrub, white flowers, June. 10 ft.



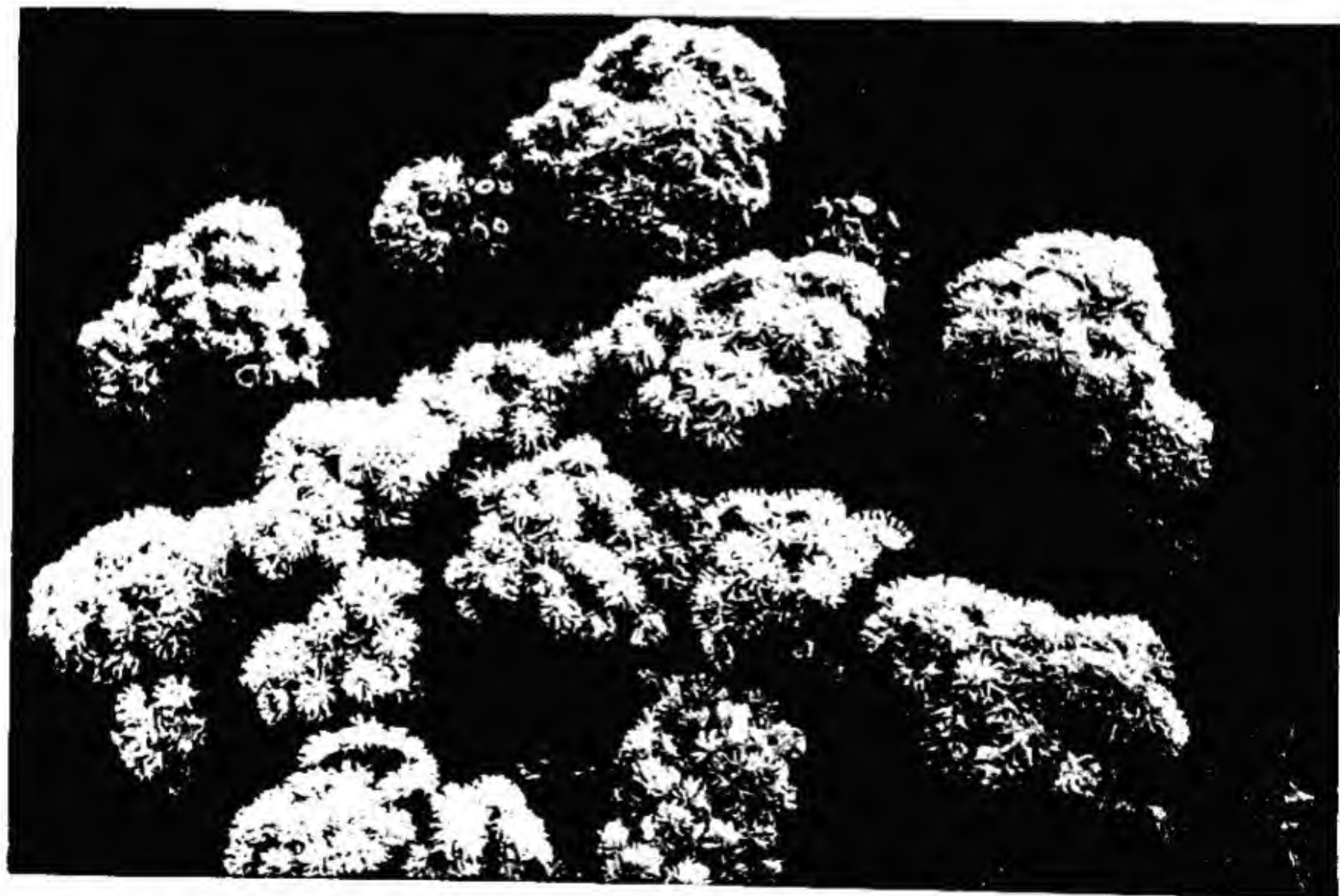
Aethionema grandiflorum. Hardy perennial, rose-pink flowers, May. 1 ft.



Agapanthus orientalis (*African Lily*). Hardy perennial, blue flowers, summer. 3 ft.



Agave americana (*American Aloe*). Half-hardy plant, greenish-yellow flowers. Up to 40 ft.



Ageratum houstonianum. Half-hardy annual, blue flowers, summer. 1½-2 ft.



Agrostis tenuis. Hardy perennial flowering grass, with graceful decorative inflorescence. 12-18 in.



Ailanthus altissima. Hardy tree, ornamental foliage. 30-40 ft.



Aira elegans (Hair Grass). Hardy annual grass. 1½ ft.



Ajuga genevensis. Hardy perennial, blue flower, June. 6 in.



Akebia trifoliata. Hardy climber, purple flowers, pale violet fruits. 30-40 ft.



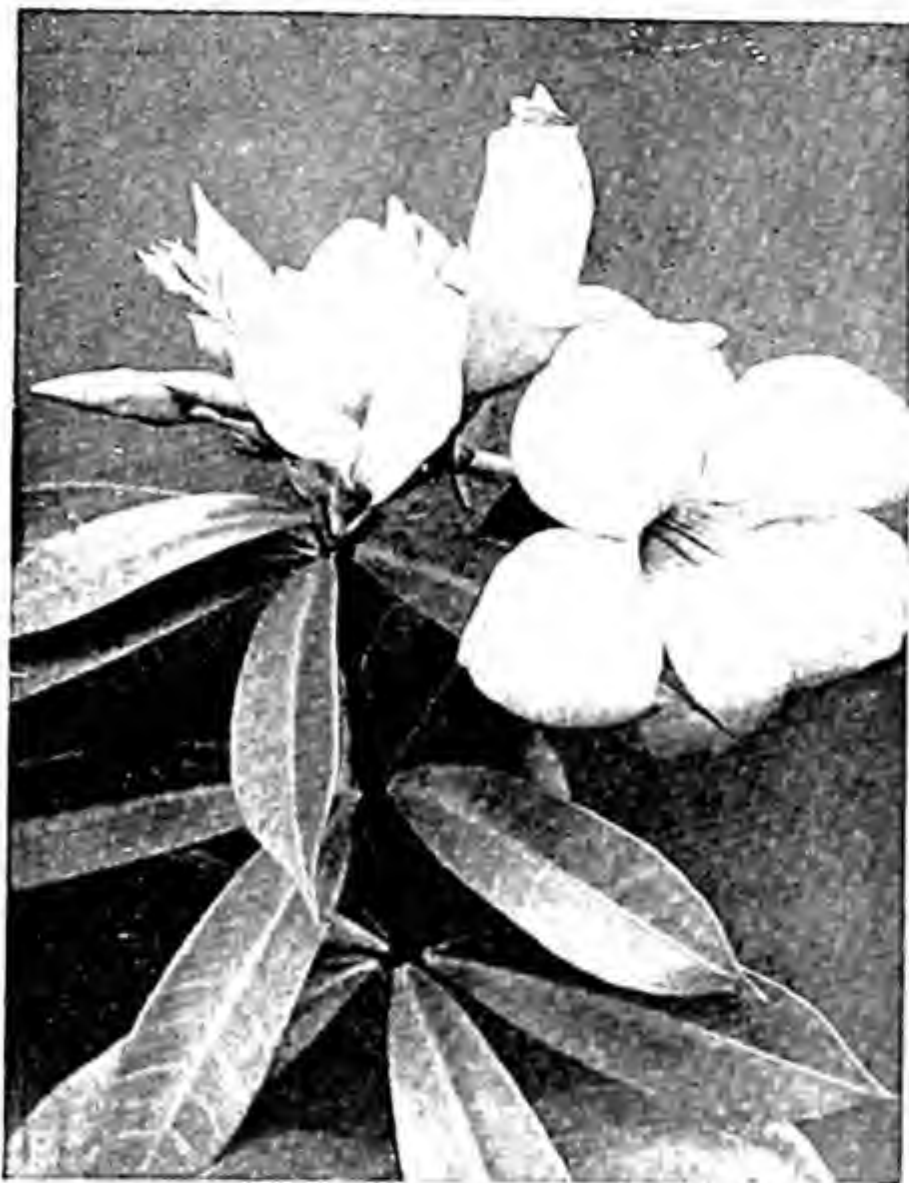
Albizzia Julibrissin (Pink Siris). Half-hardy tree, pink flowers, spring. 30 ft.



Alchemilla mollis. Hardy perennial, greenish-yellow flowers, July. 1-1½ ft.



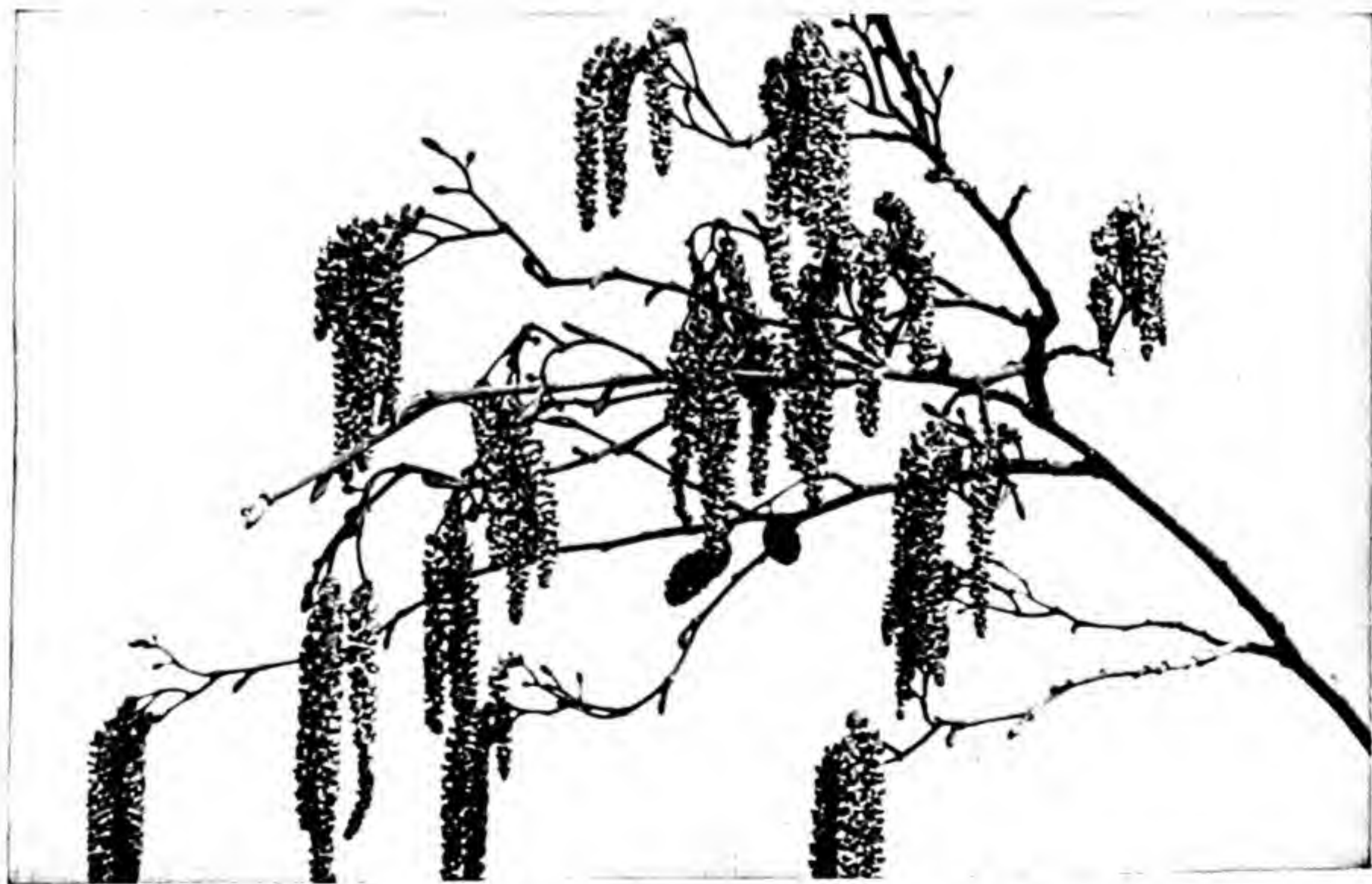
Alisma plantago-aquatica. Hardy aquatic perennial, pink flowers, summer, 2-3 ft.



Allamanda cathartica grandiflora. Stove climber, yellow flowers, summer. 5-10 ft.



Allium moly. Hardy bulb, yellow flowers, May. 1 ft.



Alnus glutinosa. (Common Alder). Hardy tree, purplish. 50-90 ft.



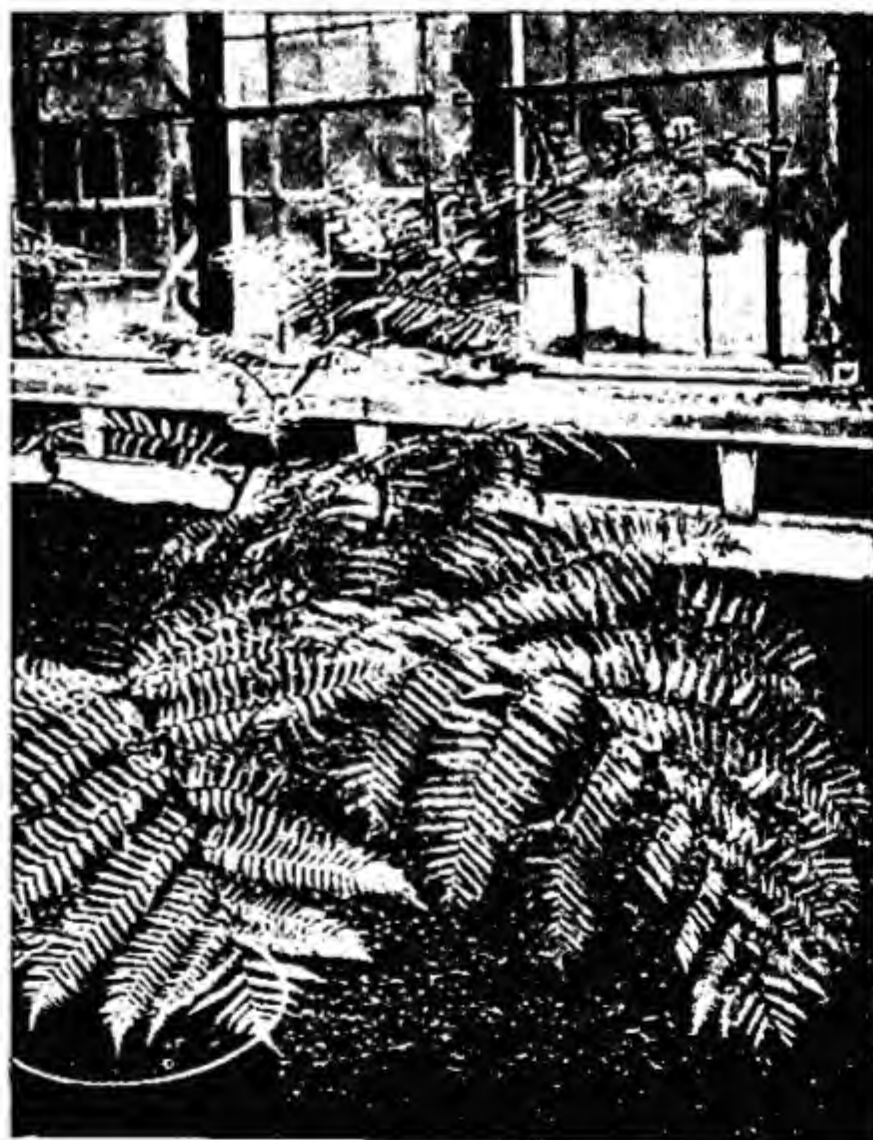
Alocasia indica metallica. Stove perennial, ornamental foliage. 1 ft.



Aloe variegata (Partridge-breasted Aloe). Greenhouse succulent, variegated leaves. 1 ft.



Alonsoa warscewiczii. Half-hardy perennial, scarlet flowers, summer. 1½–2 ft.



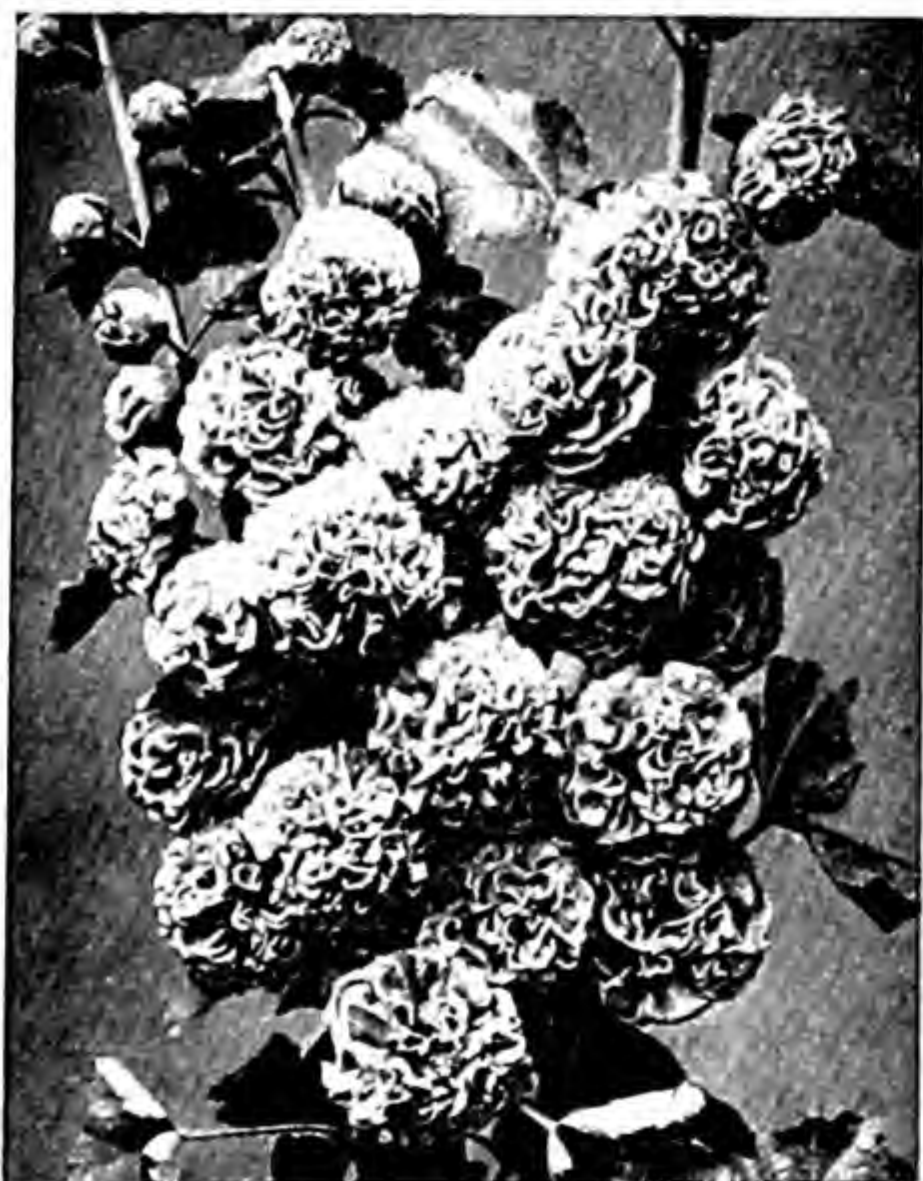
Alsophila excelsa (Norfolk Island Tree Fern). Greenhouse tree fern. 60–80 ft. (in nature).



Alstroemeria aurantiaca (Peruvian Lily). Hardy perennial, orange flowers, summer. 2-3 ft.



Alstroemeria ligtu. Hardy perennial, lilac, rose and orange flowers, summer. 2-3 ft.



Althaea rosea (Hollyhock). Hardy perennial, variously coloured flowers, summer. 6 ft.



Alyssum saxatile (Gold Dust). Hardy perennial yellow flowers, May. 1 ft.



Amaranthus caudatus (*Love-lies-bleeding*). Half-hardy annual, crimson-purple flowers, summer. 2-3 ft.



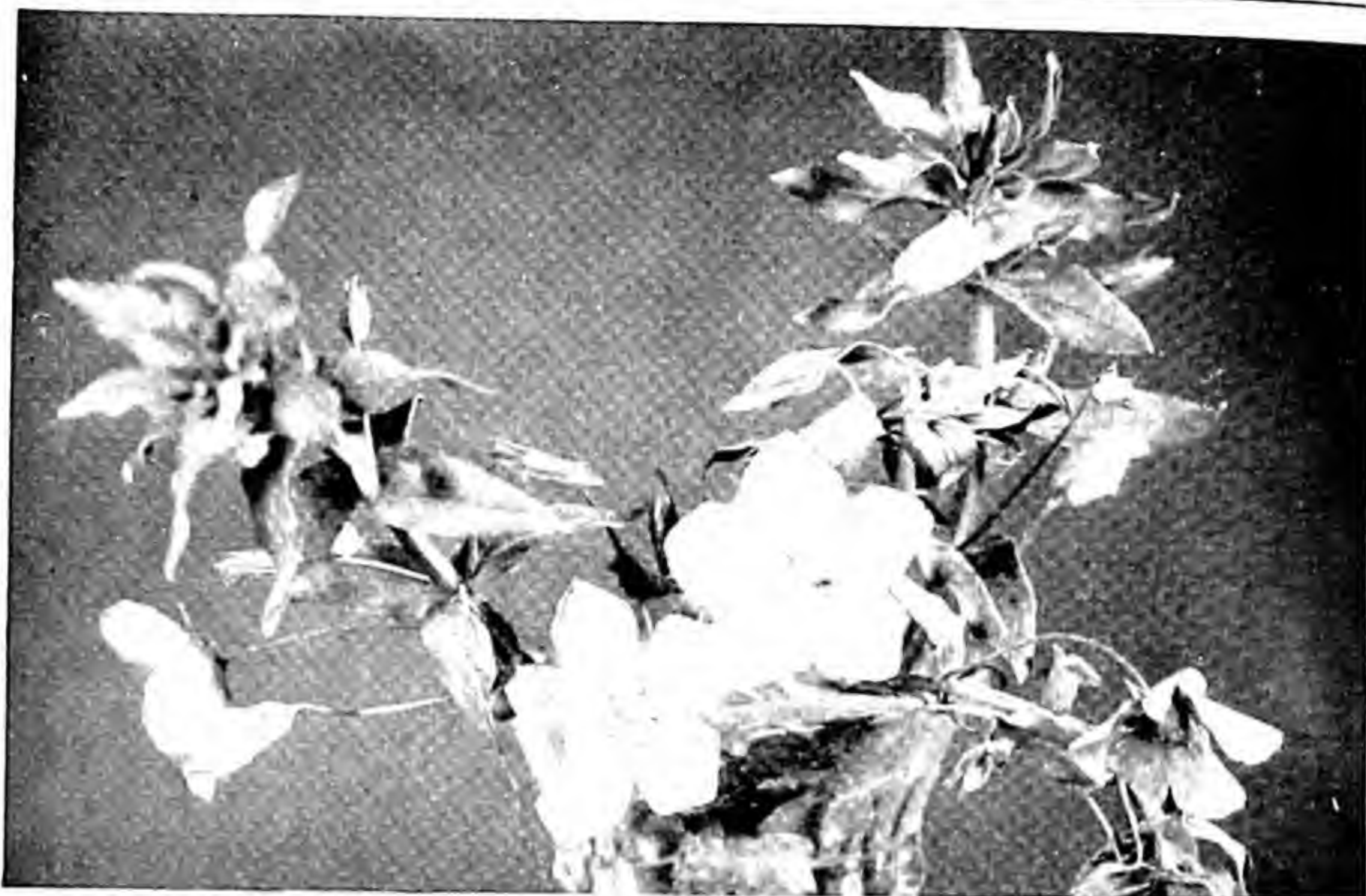
Amaryllis belladonna (*Belladonna Lily*). Hardy bulb, pink or rose-red flowers, August. 1½ ft.



Amelanchier canadensis (*Snowy Mespilus*). Hardy shrub, white flowers, April. 20 ft.



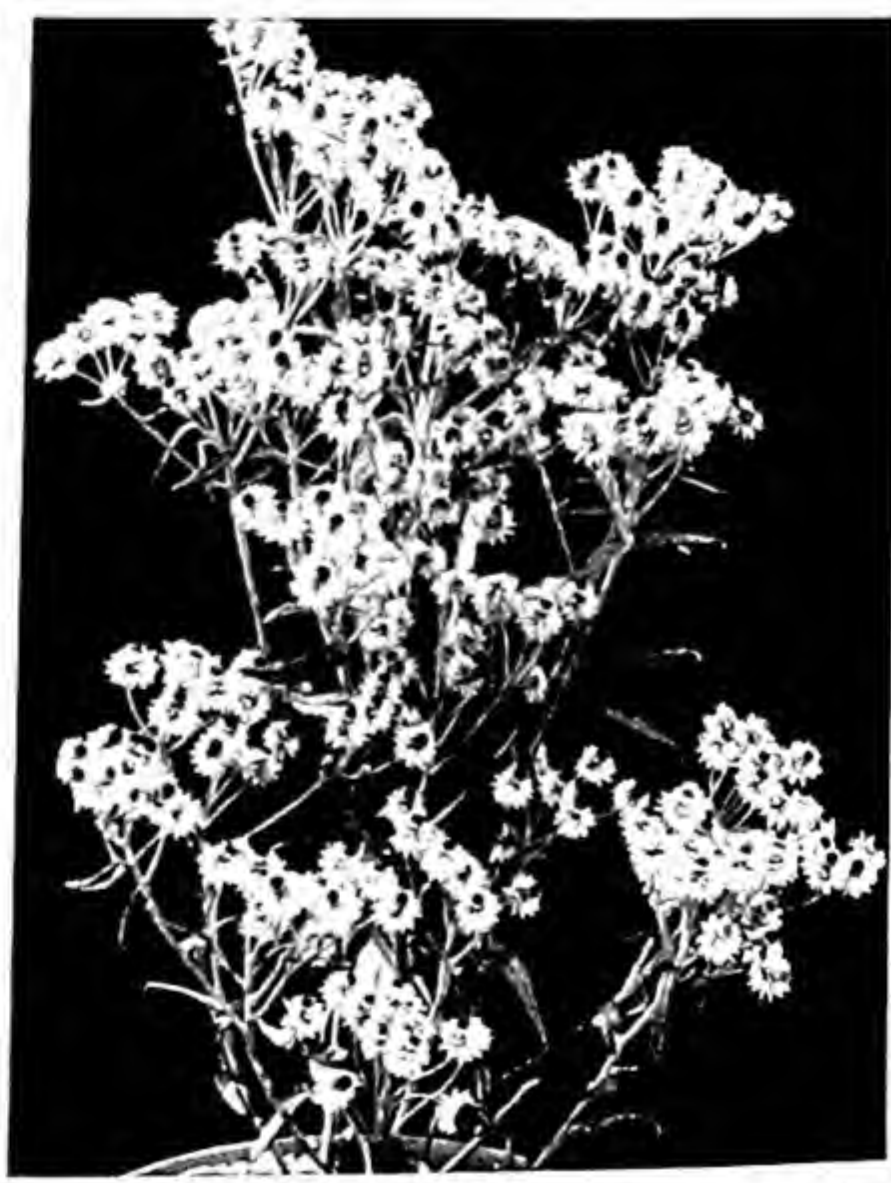
Anacyclus depressus. Hardy rock plant, white and crimson flowers, spring and summer. Prostrate.



Anagallis linifolia (Blue Pimpernel). Hardy perennial, blue flowers, July. 1 ft.



Ananas coccosus (Pineapple). Stove plant, edible fruit. 3 ft.



Anaphalis triplinervis. Hardy perennial, white flowers, July and August, 1-2 ft.



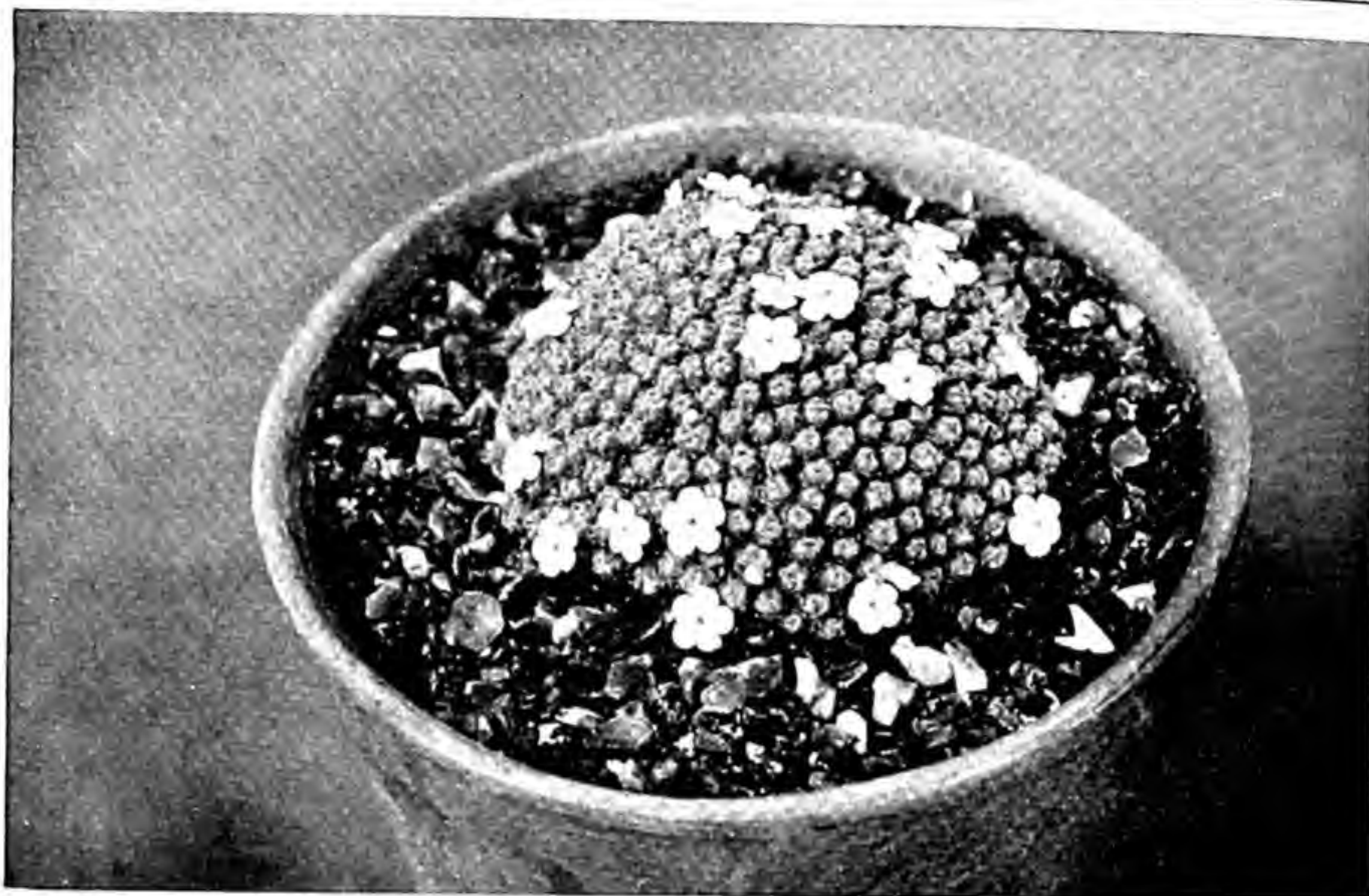
Anchusa azurca (Alkanet). Hardy perennial, blue flowers, July. 3-9 ft.



Anchusa capensis. Hardy annual, blue flowers, summer and autumn. 1-1½ ft.



Andromeda polifolia (Marsh Rosemary). Hardy shrub, pink flowers, June. 1 ft.



Androsace helvetica. Hardy perennial rock plant, pink flowers fading to white, June and July. 1 in.



Androsace lanuginosa. Hardy perennial rock plant, rose-pink flowers, July. 6 in.



Anemone coronaria. Hardy perennial, variously coloured flowers, spring. $1\frac{1}{2}$ ft.



Anemone hupehensis. Hardy perennial, pink flowers, late summer and autumn. $1\frac{1}{2}$ –2 ft.



Anemone pulsatilla (*Pasque Flower*). Hardy perennial, purple flowers, April. 1 ft.



Anemonopsis macrophylla. Hardy perennial, lilac purple flowers, June and July. 2-3 ft.



Angelica archangelica (Holy Ghost). Hardy perennial, greenish flowers, July. 4-5 ft.



Angraecum sesquipedale. Stove epiphytic orchid, white flowers, late autumn. 3 ft.



Anguloa chlorina (Cradle Orchid). Terrestrial orchid, yellow, crimson marked flowers, spring, 18 in.



Annona reticulata (Custard Apple). Store shrub, yellow and brown flowers, summer, edible fruit.



Antennaria dioica. Hardy perennial, pink flowers, June, 3 in.



Anthemis tinctoria (Golden Marguerite). Hardy perennial, yellow flowers, July and August, 2 ft.



Anthericum liliago (St. Bernard Lily). Hardy perennial, white flowers, July and August. 1-1½ ft.



Anthurium andreanum (Flamingo Plant). Stove perennial, scarlet and yellow flowers, summer.



Antirrhinum majus (Snapdragon). Half-hardy perennial, variously coloured flowers, summer. 1-4 ft.



Aponogeton distachyus (Water Hawthorn). Hardy floating aquatic, white flowers, summer.



Aporocactus flagelliformis. Greenhouse cactus, red or pink flowers, summer.



Aquilegia 'Long-spurred hybrids'. Hardy perennial, variously coloured flowers, summer. 3 ft.



Arabis albida flore pleno. Hardy perennial, white double flowers, summer. 6 in.



Araucaria araucana (*Monkey Puzzle*). Hardy conifer to 100 ft.



Araucaria excelsa (*Norfolk Island Pine*). Greenhouse conifer. 100–120 ft. in native habitat.



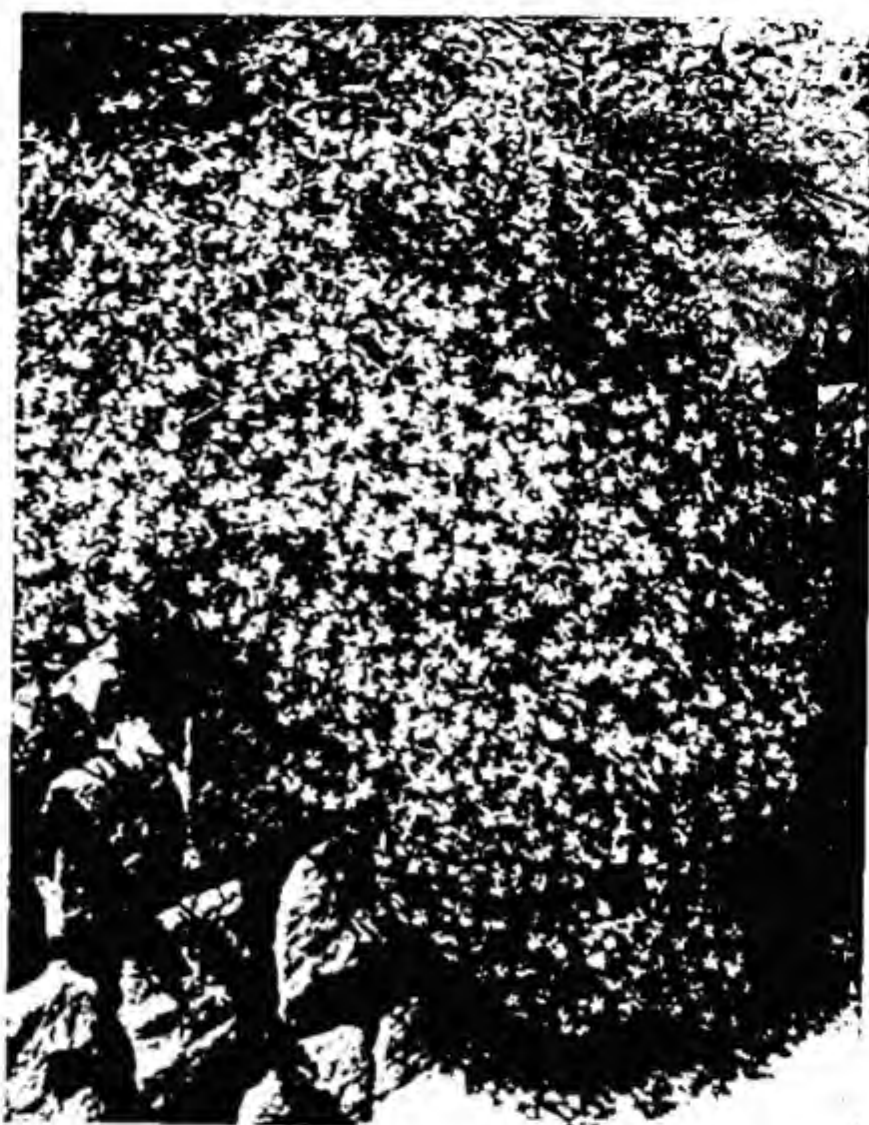
Arbutus unedo (*Strawberry Tree*). Hardy tree, white flowers, winter, scarlet fruits. 30–40 ft.



Arctotis stoechadifolia. Half-hardy annual, white flowers, summer. 2 ft.



Ardisia crispa. Stove evergreen plant, white flowers, June, red berries. 3-4 ft.



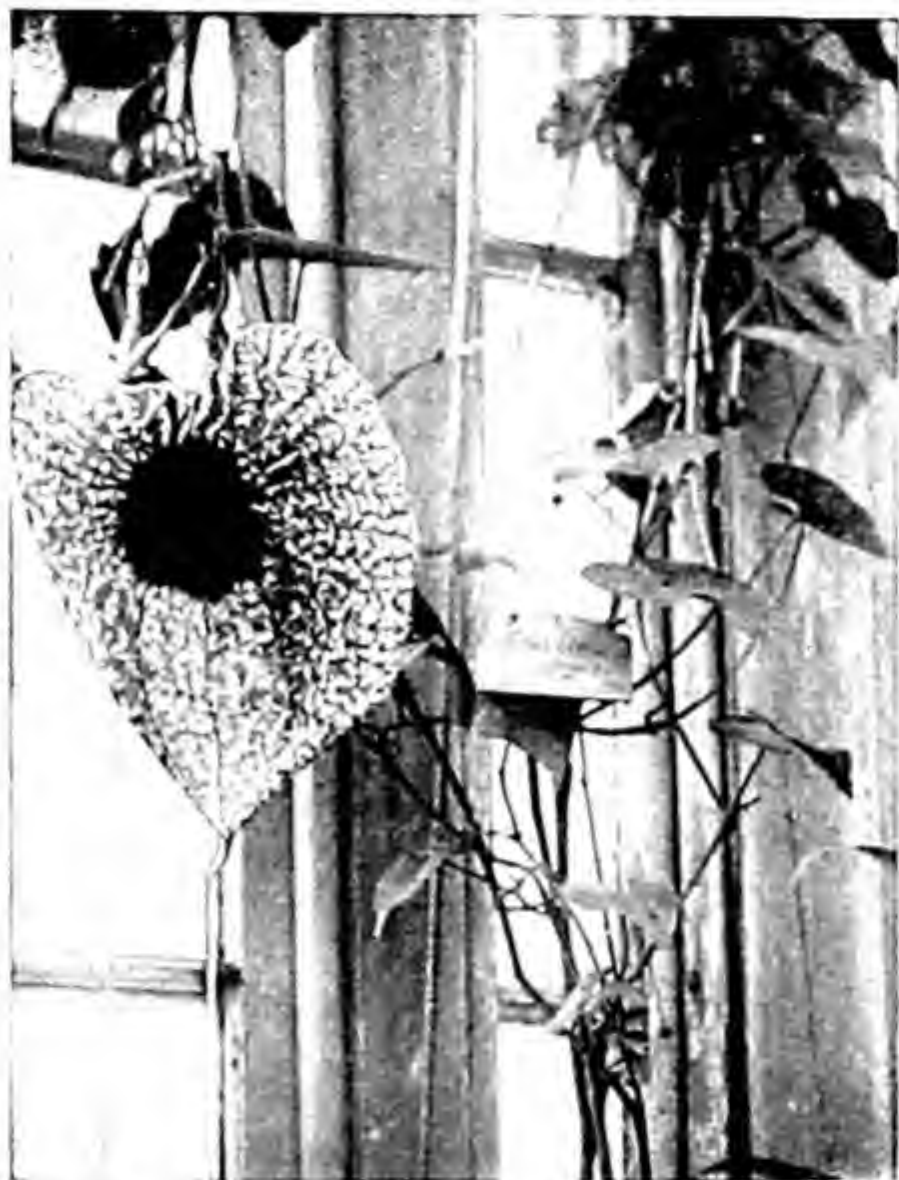
Arenaria montana (Sandwort). Hardy rock plant, white flowers, April and May. 4 in.



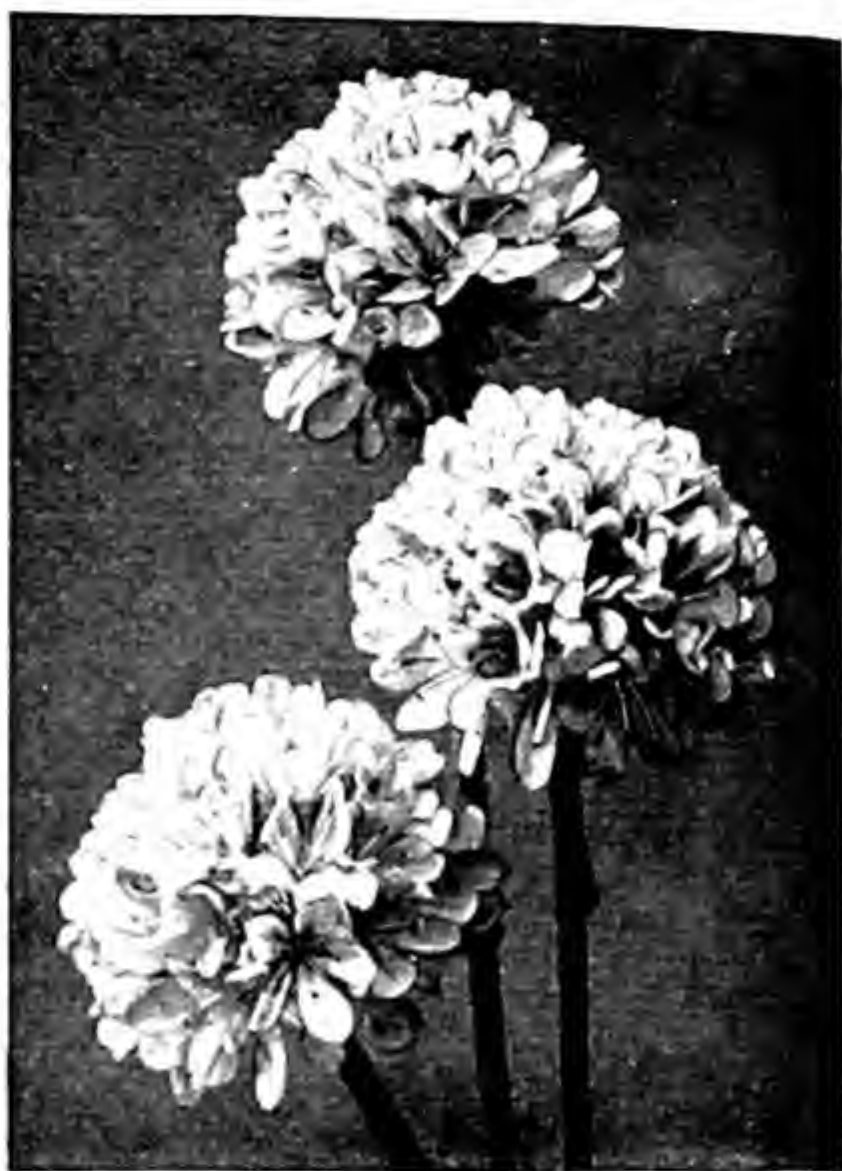
Argemone mexicana (Mexican Poppy). Hardy annual, yellow flowers, June. 2 ft.



Aristolochia durior (Dutchman's Pipe). Hardy climber, yellowish-brown flowers, May and June.



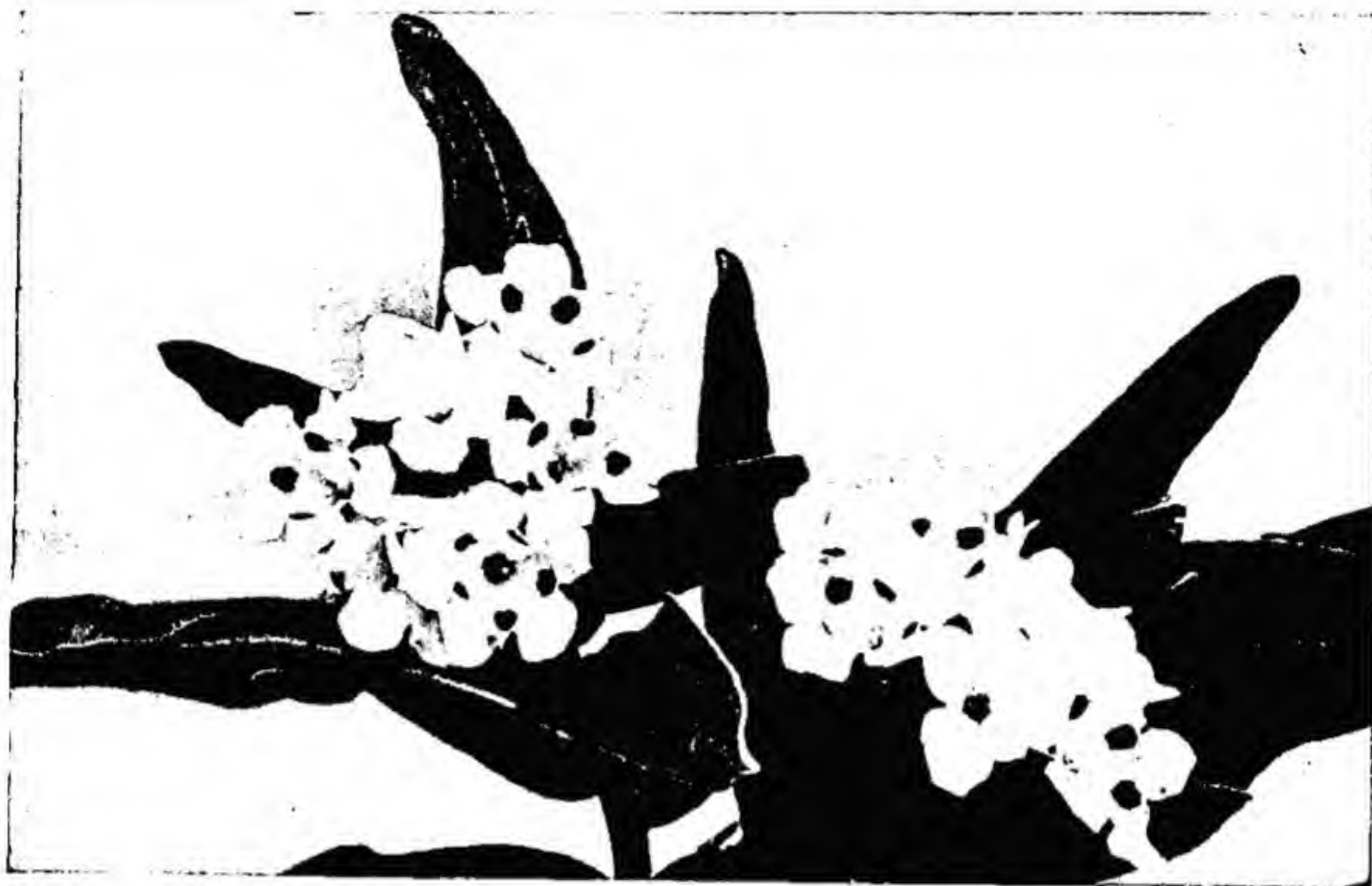
Aristolochia grandiflora. Stove climber, purple-spotted flowers, June and July. 8-10 ft.



Armeria pseudo-armeria. Hardy perennial, pink flowers, June. 2 ft.



Armeria juniperifolia. Hardy rock plant, rose-red flowers, June. 3 in.



Arnebia echioides (Prophet Flower). Hardy perennial, yellow and purple flowers, summer. 1 ft.



Artemisia ludoviciana. Hardy perennial, yellow flowers, summer. 3 ft.



Arum maculatum (Cuckoo Pint). Hardy perennial, yellowish-green, purple-spotted flowers. 6 in.



Arundinaria falcata. Hardy shrubby bamboo. Up to 20 ft.



Arundo donax (Giant Reed). Hardy perennial grass, pinkish-white flowers, August. 12 ft.



Asclepias syriaca (Milkweed). Hardy perennial, purple flowers, July. 3-5 ft.



Asparagus plumosus (Asparagus Fern). Greenhouse foliage plant. 4-10 ft.



Asperula orientalis. Hardy annual, blue flowers, summer. 6-10 in.



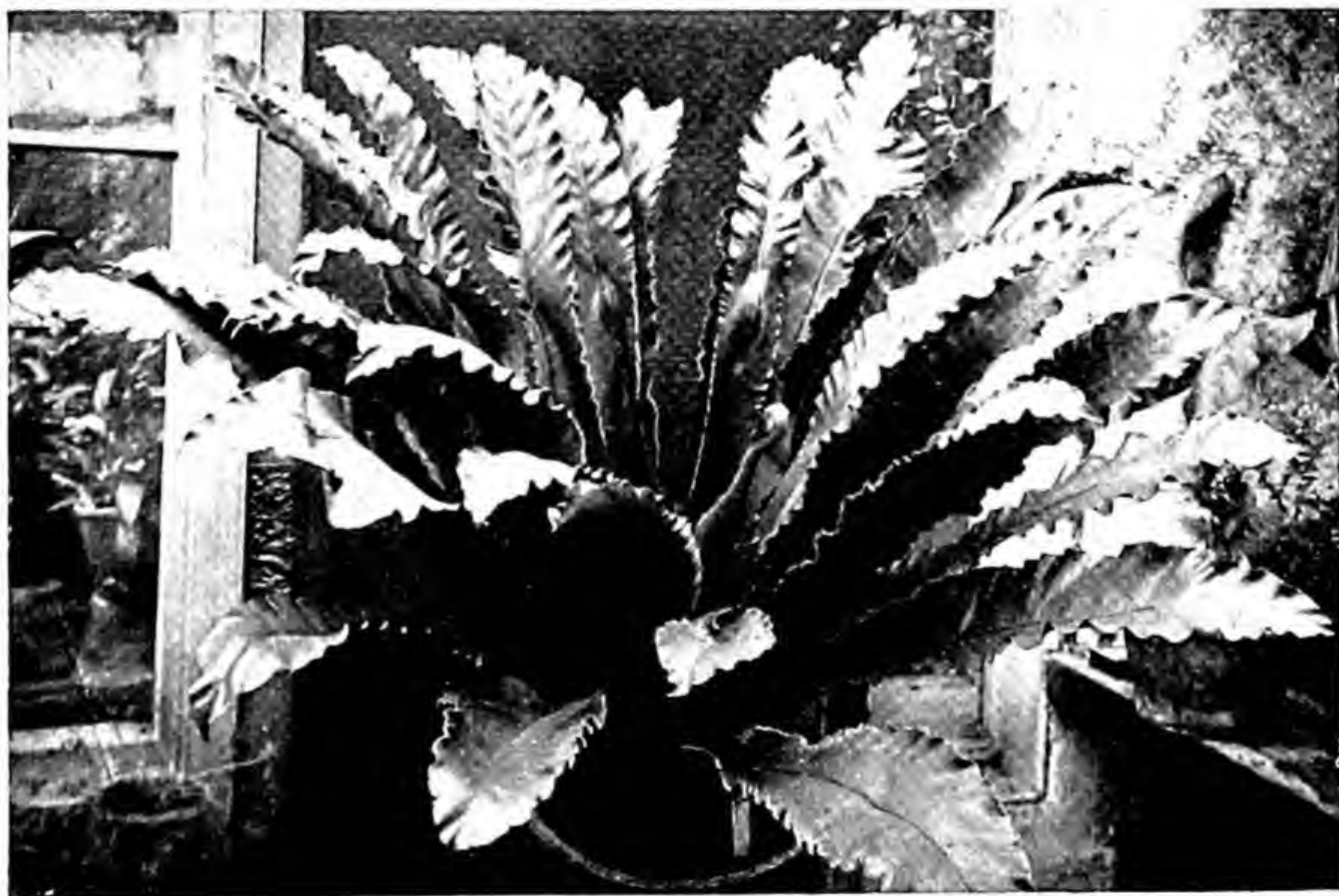
Asphodeline lutea (King's Spear). Hardy, perennial, yellow flowers, July and August. 3-4 ft.



Asphodelus albus (Asphodel). Hardy perennial, white flowers, May. 2 ft.



Aspidistra elatior. Evergreen room plant. 1-2 ft.



Asplenium nidus (*Bird's Nest Fern*). Stove fern. 3-6 ft.



Aster amellus (*Italian Starwort*). Hardy perennial, purple flowers, August. 2 ft.



Aster yunnanensis. Hardy perennial, lilac-blue flowers, June and July. 9-12 in.



Aster novi-belgii 'Peace' (*Michaelmas Daisy*). Hardy perennial, pale blue flowers, September. 4 ft.



Astilbe japonica. Hardy perennial, white flowers, May. 2 ft.



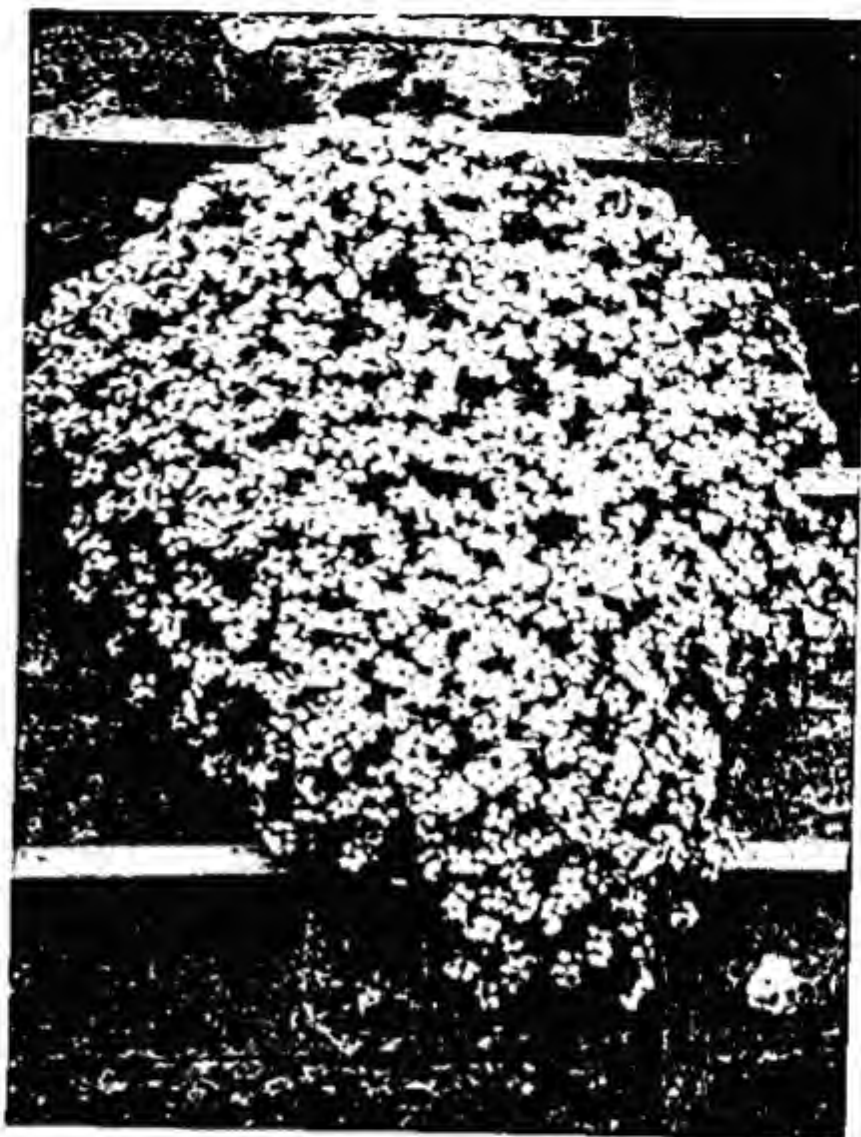
Astragalus alopecuroides (Milk Vetch). Hardy perennial, yellow flowers, June. 3-5 ft.



Astrantia major (Masterwort). Hardy perennial, pink and white flowers, May and June. 2 ft.



Atriplex halimus (Shrubby Goosefoot). Hardy shrub, silvery-grey leaves, 4-6 ft.



Aubrieta deltoidea (Purple Rock Cress). Hardy rock plant, purple flowers, spring, 2 in.



Aucuba japonica (Variegated Laurel). Hardy evergreen shrub, red berries, winter, 6-10 ft.



Azolla caroliniana. Half-hardy aquatic, pale green foliage turning red, autumn.



Babiana stricta rubrocyanea. Half-hardy bulbous plant. Lilac and red flowers, May to June.



Baptisia australis (False Indigo). Hardy perennial, blue flowers, early summer, 2-3 ft.



Beaufortia sparsa. Greenhouse evergreen shrub, red flowers, June, 2 ft.



Begonia 'Flaming Torch'. Tuberous-rooted greenhouse perennial, scarlet flowers, winter. 1-2 ft.



Begonia 'Hercules'. Tuberous-rooted greenhouse perennial, bright red flowers, summer. 2 ft.



Begonia Rex. Greenhouse perennial foliage plant, variously coloured leaves. 2 ft.



Begonia 'Gloire de Lorraine'. Fibrous-rooted greenhouse perennial, pink flowers, winter. 1½ ft.



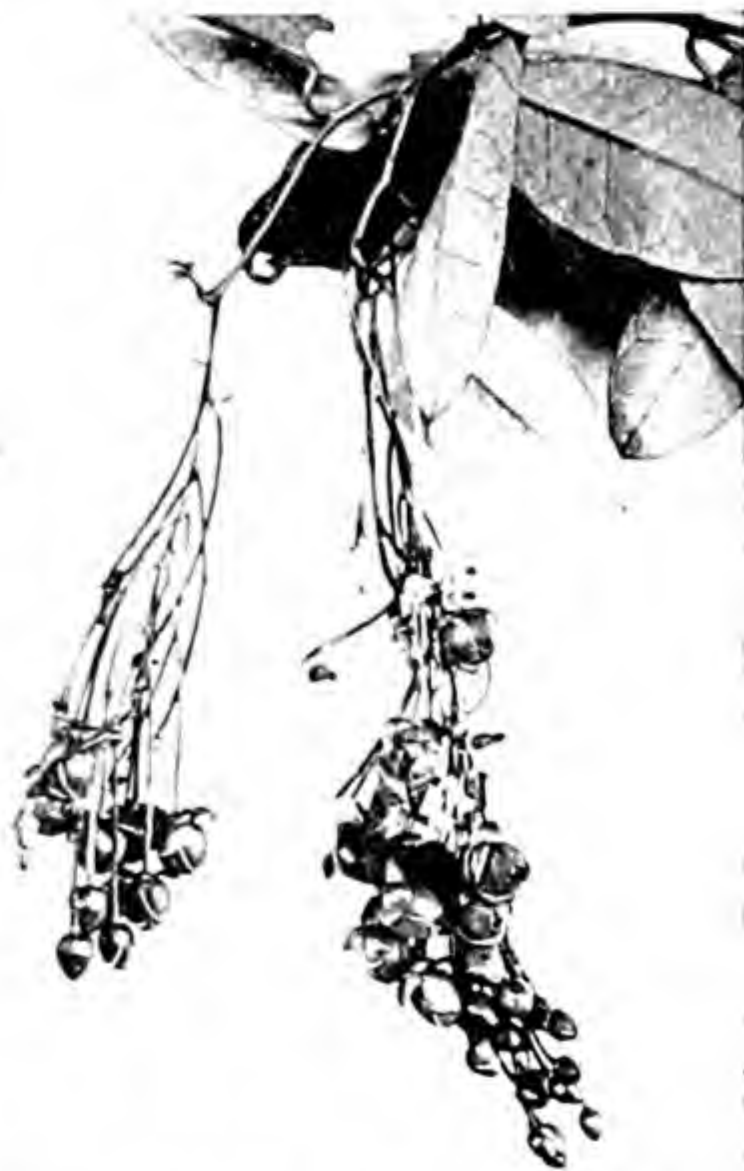
Bellis perennis flore-pleno (*Double Daisy*). Hardy perennial, white to red flowers, summer. 6 in.



Bellium bellidiodes (*False Daisy*). Hardy perennial, white flowers, July. 3 in.



Beloperone guttata (*Shrimp Plant*). Greenhouse plant, white-spotted purple flowers, August. 1½ ft.



Berberidopsis corallina. Hardy shrub, crimson flowers, June. 5-10 ft.



Berberis Jamesiana. Hardy deciduous shrub, coral fruit. 8 ft.



Berberis lologensis. Hardy shrub golden flowers, spring. 8 ft.



Berberis hakeoides. Hardy shrub, yellow flowers, spring. 12 ft.



Berkheya macrocephala. Hardy perennial, yellow flowers, July. 3-4 ft.



Betula papyrifera (Paper Birch). Hardy deciduous tree, white bole. 60 ft.



Betula pendula youngii (Weeping Birch). Hardy deciduous tree. 20 ft.



Billardiera longiflora. Half-hardy climber, creamy-white to purple flowers, summer, blue berries. 5 ft.



Billbergia nutans. Stove or house plant, rose bracts, yellowish-green, blue-edged flowers. $1\frac{1}{2}$ ft.



Blandfordia nobilis. Greenhouse evergreen perennial, orange flowers, July. 2 ft.



Blechnum gibbum (syn. *Lomaria gibba* var. *platyptera*). Stove fern. 5 ft.



Bletia shepherdii. Greenhouse terrestrial orchid, red-purple and yellow flowers, summer. 3 ft.



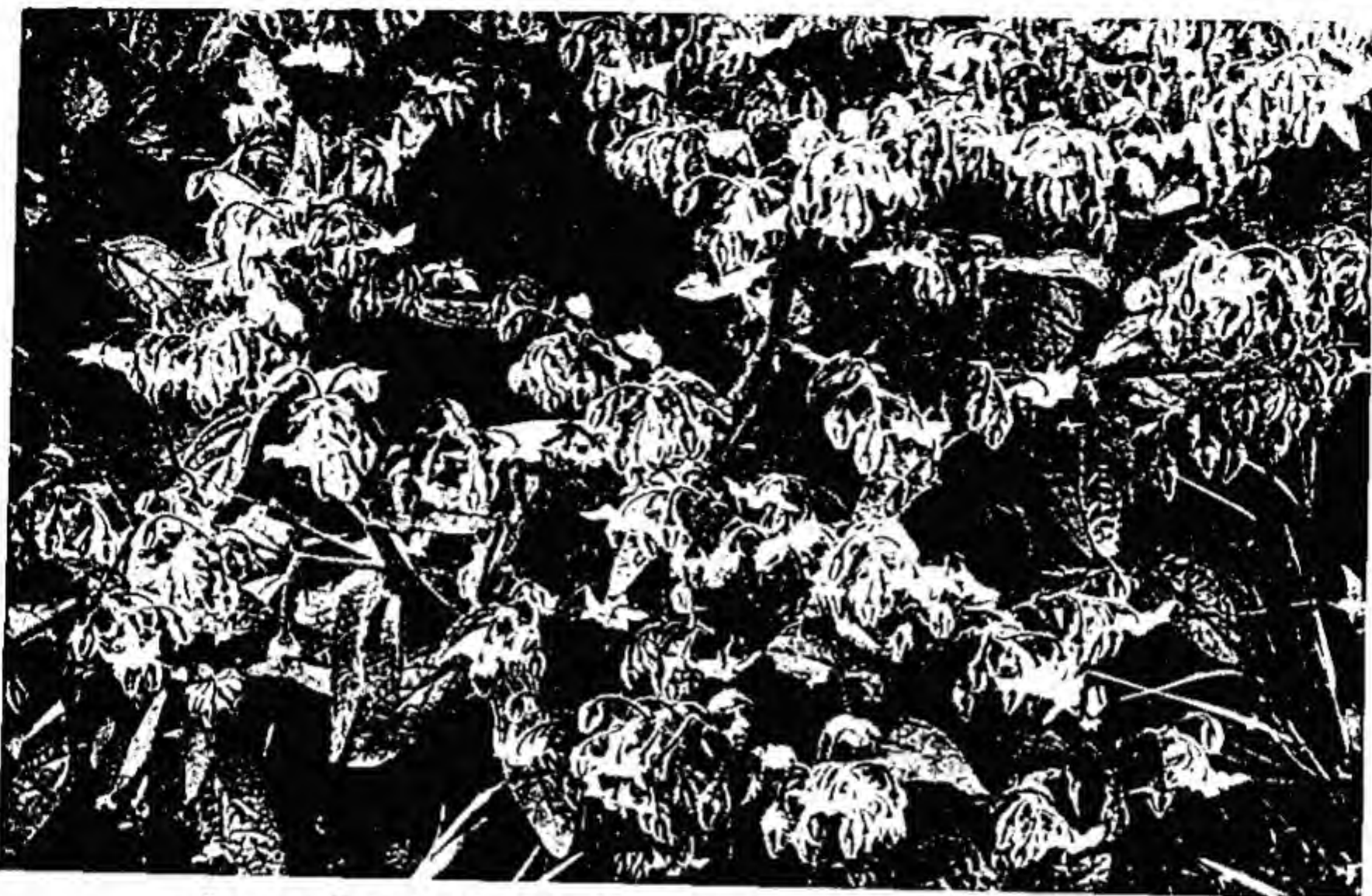
Blumenbachia hieronymii. Half-hardy biennial, white flowers, July. 1½ ft.



Boltonia asteroides (False Chamomile). Hardy perennial, white flowers, July. 4-5 ft.



Bomarea multiflora. Tender climbing perennial, red and yellow flowers, summer. 6 ft.



Borago officinalis (Borage). Hardy annual, blue flowers, summer. $1\frac{1}{2}$ –2 ft.



Boronia megastigma. Greenhouse evergreen shrub, maroon and yellow flowers, April. $1\frac{1}{2}$ ft.



Bougainvillea magnifica Traillii. Stove climber, red flowers, summer. 5–15 ft.



Bouvardia hybrida 'President Garfield'. Greenhouse evergreen shrub, white flowers, autumn. 2 ft.



Brachycome iberidifolia (Swan River Daisy). Half-hardy annual, blue flowers, summer. 1 ft.



Brassia verrucosa. Epiphytic orchid, greenish flowers, spring and summer.



Brassocattleya lindleyana. Epiphytic orchid, bluish-white flowers, autumn.



Briza maxima (Pearl Grass). Hardy annual grass, flowering June and July. 1 ft.



Bromus inermis (Brome Grass). Ornamental perennial grass. Up to 4 ft.



Broussonetia papyrifera (Paper Mulberry). Hardy tree, white flowers, orange fruit. 50 ft.



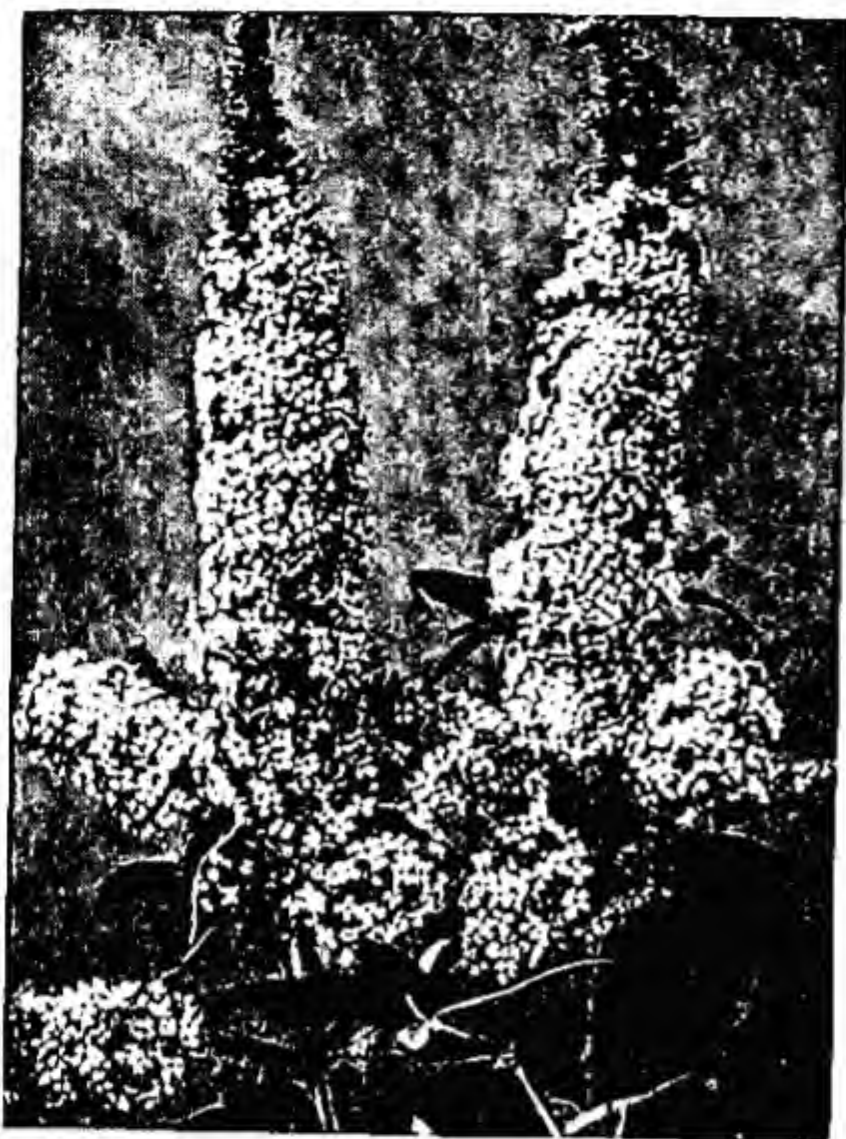
Browallia speciosa. Greenhouse annual, pale mauve and purple flowers, July. 2 ft.



Brückenthalia spiculifolia (*Spike Heath*). Dwarf shrub, pink flowers, summer. 6 in.



Brunfelsia calycina. Stove evergreen shrub, purple fragrant flowers, summer. 2 ft.



Buddleia davidii. Hardy shrub, lavender flowers, summer. 10-15 ft.



Buddleia globosa (Orange Ball Tree). Hardy shrub, orange flowers, summer. 15 ft.



Buddleia colvilei. Half-hardy shrub, rose-coloured flowers, spring. 20 ft.



Bulbocodium vernum (Spring Meadow Saffrons). Hardy bulb, purple flowers, March. 6 in.



Buphthalmum speciosum (*Yellow Oxeye*). *Hardy perennial, yellow flowers, June. 5 ft.*



Bupleurum fruticosum. *Half-hardy shrub, yellow flowers, July. 5 ft.*



Butomus umbellatus (*Flowering Rush*). *Hardy aquatic perennial, pink flowers, summer. 4-5 ft.*



Buxus sempervirens (*Box*). *Hardy evergreen shrub. 20 ft.*



Caladium bicolor. Stove tuberous-rooted foliage plant, 1½ ft.



Calandrinia grandiflora (Rock Purslane). Hardy perennial, light purple flowers, summer, 1 ft.



Calanthe hybrid. Greenhouse deciduous orchid, white and yellow flowers, winter.



Calathea vandenheckei. Stove foliage plant, coloured leaves, 2-2½ ft.



Calceolaria herbeohybrida. Greenhouse perennial, yellow spotted flowers, early summer. 1-2 ft.



Calceolaria integrifolia. Half-hardy shrubby plant, yellow to red-brown flowers, summer. 1-3 ft.



Calendula officinalis (Pot Marigold). Hardy annual, orange yellow flowers, summer. 1 ft.



Calla palustris (Bog Arum). Hardy aquatic, white flowers, red berries, summer. 6 in.



Callirhoe involucrata (Poppy Mallow). Hardy perennial, crimson flowers, summer. 1 ft.



Callistemon citrinus (Bottle Brush Tree). Greenhouse shrub, crimson flowers, June, 8-10 ft.



Callistephus chinensis (China Aster). Half-hardy annual variously coloured flowers, summer.



Callistephus sinensis. Half-hardy annual, various coloured flowers, summer. 6-24 in.



Calluna vulgaris (Ling, heather). Hardy shrub, purple or white flowers, late summer. 2 ft.



Calochortus venustus (Mariposa Lily). Half-hardy corm, white and maroon flowers, July. 1½ ft.



Caltha palustris (Marsh Marigold). Hardy perennial, yellow flowers, April. 1 ft.



Calycanthus floridus (Carolina Allspice). Hardy shrub, brownish-purple flowers, June. 6 ft.



Camassia quamash (Quamash). Hardy perennial, pale blue flowers, June. 2 ft.



Camellia japonica. Hardy shrub, red, pink or white flowers, spring. 15-20 ft.



Camellia williamsii. Hardy shrub, pale pink flowers, spring. 10 ft.



Campanula barbata. Hardy rock plant, lavender-blue flowers, June. 9 in.



Campanula cochlearifolia. Hardy rock plant, blue flowers, July. 4 in.



Campanula carpatha. Hardy rock plant, pale lavender flowers, summer. 6 in.



Campanula isophylla alba. Hardy perennial, white flowers, June. 4-6 in.



Campanula latifolia. Hardy perennial, blue flowers, July. 4-5 ft.



Campanula medium (Canterbury Bell). Hardy biennial, blue, pink or white flowers, summer. 3 ft.



Campanula persicifolia. Hardy perennial, blue or white flowers, June. 3 ft.



Campanula saxifraga. Hardy rock plant, deep blue flowers, July. 6 in.



Campanula zoysii. Hardy rock plant, pale blue flowers, summer. 2-3 in.



Campsis tagliabuana (*Trumpet Creeper*). Hardy climber, scarlet flowers, summer.



Canna generalis (*Indian Shot*). Stove perennial, yellow and red flowers, summer. 4 ft.



Cannabis sativa (*Hemp*). Hardy annual, green flowers, June. 4-10 ft.



Capsicum frutescens grossum (*Sweet Pepper*). Greenhouse annual, red or yellow fruit.



Caragana arborescens. Hardy shrub, yellow flowers, May. 15 ft.



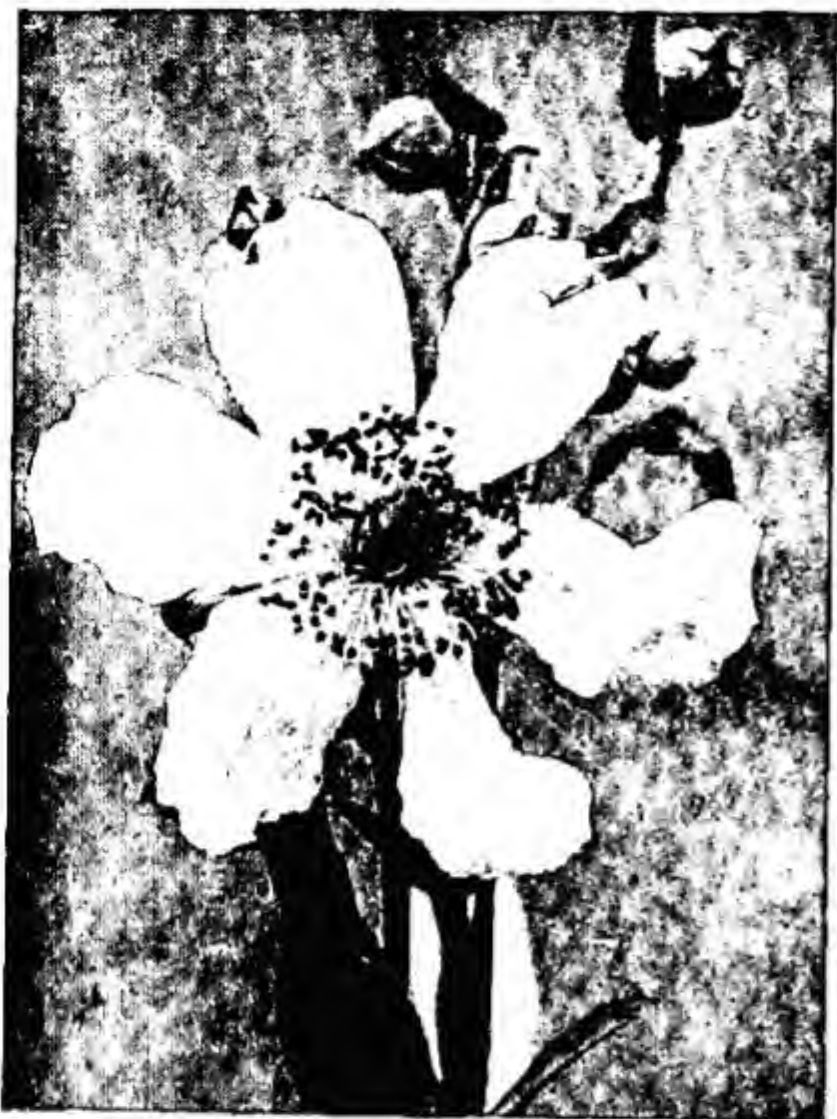
Cardamine pratensis pleniflora (Double Lady's Smock). Hardy perennial, lilac flowers, May. 1-2 ft.



Cardiocrinum giganteum (Giant Lily). Hardy bulb, white flowers, summer. 6-12 ft.



Carlina acanthifolia. Hardy rock plant, white flowers, June. 4-6 in.



Carpenteria californica. Hardy shrub, white flowers, spring. 6 ft.



Caryopteris clandonensis (Blue Spiraea). Hardy shrub, violet-blue flowers, August-September. 2 ft.



Cassia fistula (Pudding Pipe Tree). Greenhouse shrub, pale yellow flowers, summer. 20-30 ft.

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Cassiope wardii. Hardy shrub, white flowers, May. 9-12 in.



Castanea sativa (*Spanish Chestnut*). *Hardy deciduous tree, 100ft.*



Catalpa bignonioides (*Indian Bean*). *Fruits hanging on winter shoots (see below), 25-30 ft.*



Catalpa bignonioides (*Indian Bean*). *Hardy tree, yellow and purple-spotted white flowers, July, 25-30 ft.*



Catananche caerulea (*Blue Cupidone*). Hardy perennial, blue flowers, July and August. 2 ft.



Cattleya hybrid 'Princess Royal'. Epiphytic orchid, white and purple flowers, summer.



Ceanothus hybrid 'Gloire de Versailles'. Hardy shrub, blue flowers, July-September. 3-5 ft.



Ceanothus rigidus grandifolius. Half-hardy shrub, violet flowers, April. 6-12 ft.



Cedronella triphylla (Balm of Gilead). Half-hardy shrub, purple flowers, July. 3-4 ft.



Cedrus atlantica glauca (Mount Atlas Cedar). Hardy conifer, bluish foliage. 80-100 ft.



Celastrus orbiculatus. Hardy climber, greenish-yellow flowers, red and golden fruits. 30 ft.



Celosia plumosa. Greenhouse annual, red or yellow flowers, summer. 2 ft.



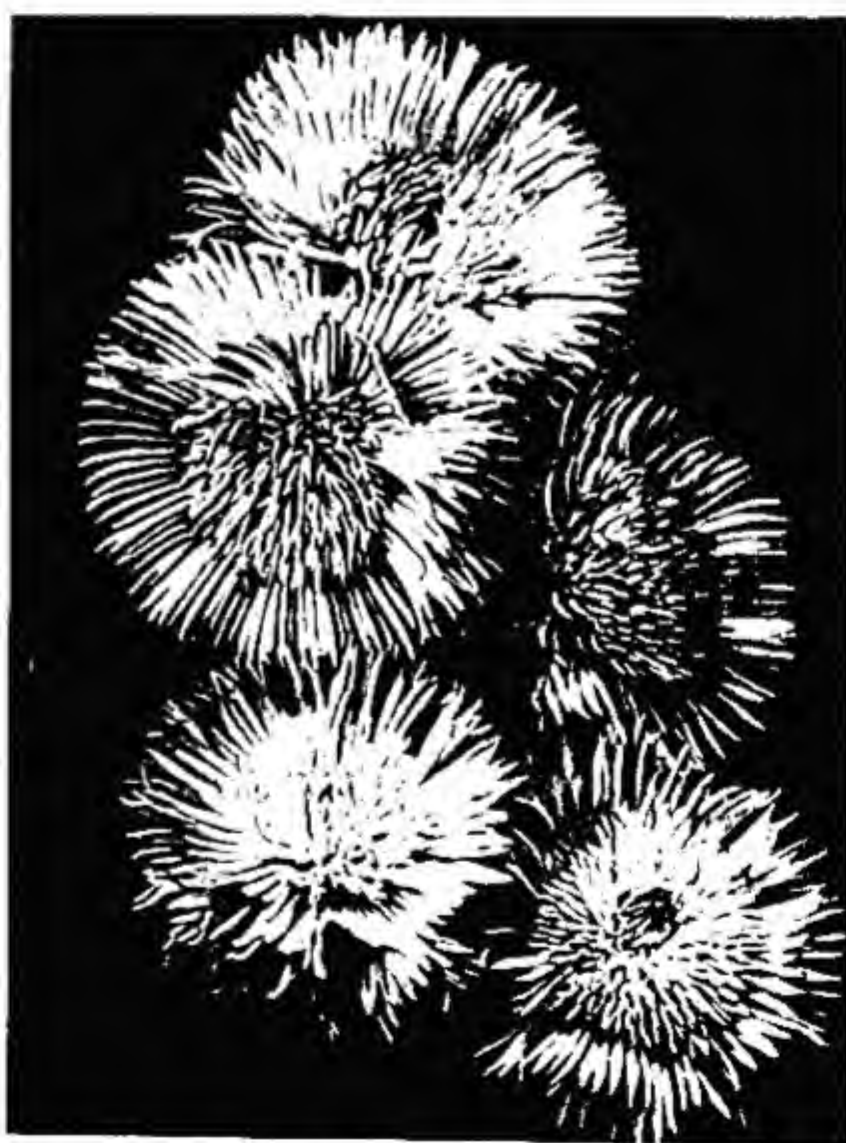
Celsia cretica (Cretan Mullein). Half-hardy perennial, yellow flowers, summer. 3-5 ft.



Centaurea babylonica. Hardy perennial, yellow flowers, July. 5-7 ft.



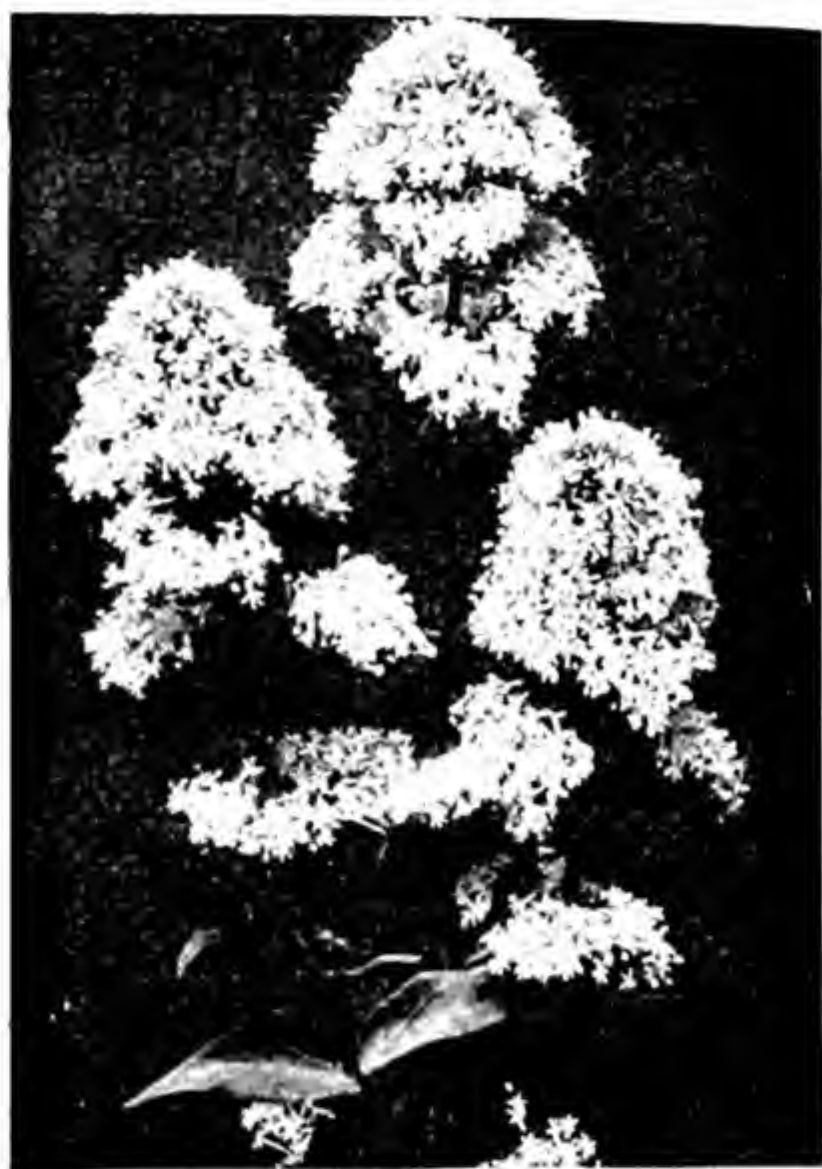
Centaurea cyanus (Cornflower). Hardy annual, blue, rose or white flowers, summer. 1-3 ft.



Centaurea moschata (Sweet Sultan). Hardy annual, variously coloured flowers, summer. 2 ft.



Centaurium portense. Hardy annual, bright rose flowers, summer, 4 in.



Centranthus ruber albus (Valerian). Hardy perennial, white flowers, June to September, 1½ ft.



Cephalaria alpina (Giant Scabious). Hardy perennial, yellow flowers, July, 5 ft.



Cephalotaxus harringtonia drupacea (Plum Yew). Hardy evergreen conifer, 10-30 ft.



Cerastium tomentosum. Hardy perennial, white flowers, May. 6 in.



Ceratostigma willmottianum. Hardy shrub, blue flowers, July to October. 2-3 ft.



Cercidiphyllum japonicum. Hardy tree, autumn-tinted leaves. 20-30 ft.



Cercis siliquastrum (*Judas Tree*). Hardy tree, rose-purple flowers, April. 15-25 ft.



Cestrum aurantiacum. Greenhouse climber, orange-yellow flowers, April to June. 5 ft.



Chaenomeles japonica alpina. Hardy shrub, brick-red flowers, spring, yellow fruits. 3 ft.



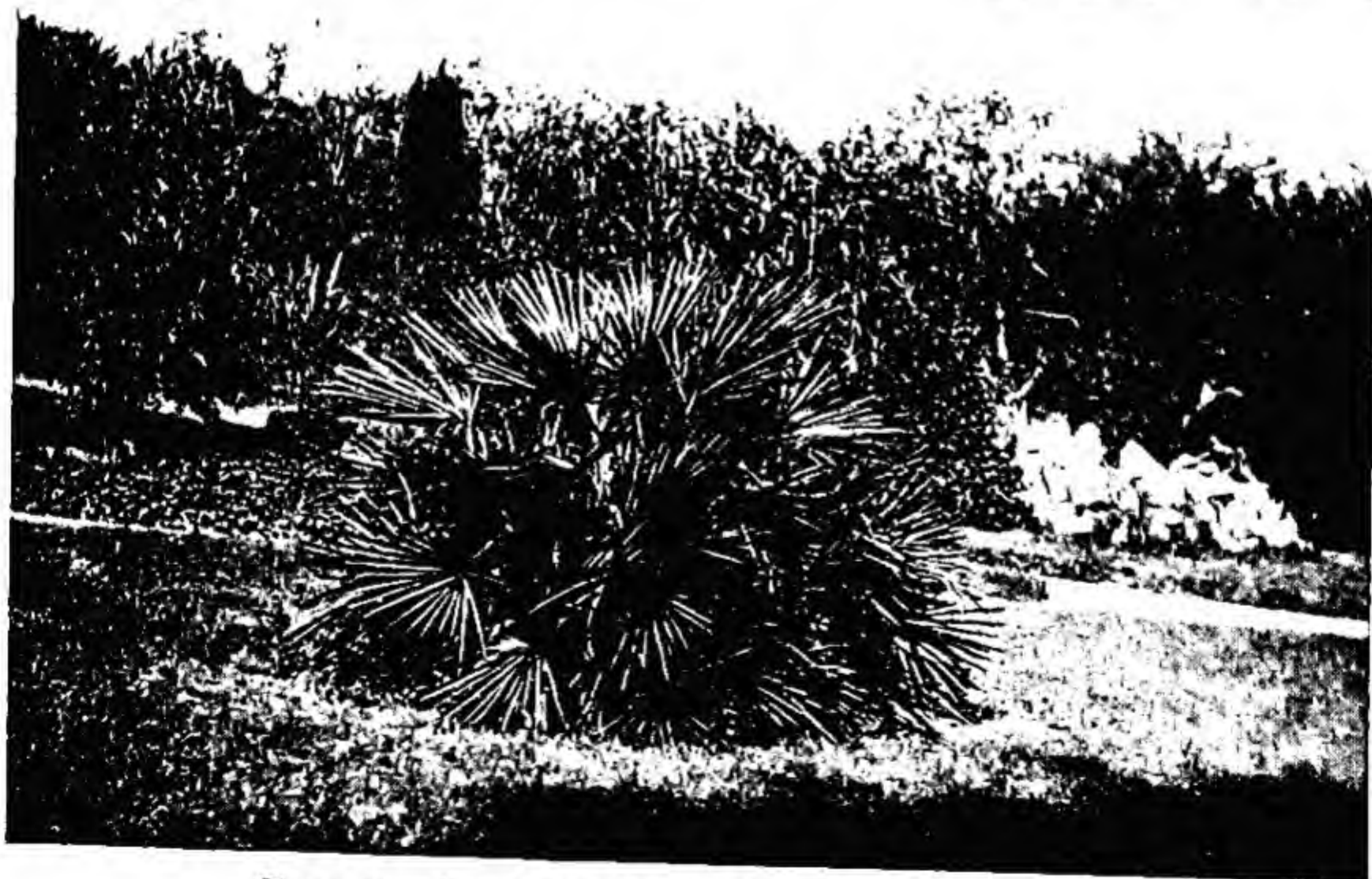
Chaenomeles speciosa. Hardy shrub, scarlet flowers, March to June. 10 ft.



Chamaecyparis lawsoniana nana. *Hardy conifer*, 8 ft.



Chamaedorea elatior. *Stove palm* ornamental foliage. 20-30 ft.



Chamaerops humilis (*Fan Palm*). *Half-hardy palm*. 10-30 ft.



Cheilanthes gracillima (*Lace Fern*). *Greenhouse fern. 1 ft.*



Cheiranthus cheiri (*Wallflower*). *Hardy perennial, variously coloured flowers, spring. 1-2 ft.*



Chelone lyonii (*Turtle-head*). *Hardy perennial, purple flowers, August. 2-3 ft.*



Chiastophyllum oppositifolium. *Hardy succulent, yellow flowers, summer. 6 in.*



Chimonanthus praecox. Hardy shrub, yellow and red flowers, December, 6-9 ft.



Chionanthus virginicus (Virginian Snow Flower). Hardy shrub, white flowers, June, 10-20 ft.



Chionodoxa sardensis. Hardy bulb, blue flowers, March, 6 in.



Chlorophytum capense variegatum. Greenhouse perennial, white flowers, summer. 1-1½ ft.



Choisya ternata (Mexican Orange). Hardy shrub, white flowers, May. 6 ft.



Chrysanthemum 'Shirley Triumph' (Large Exhibition). Perennial, bluish flowers, November. 4 ft.



Chrysanthemum 'Pink Curry' (Incurved). Perennial, pink flowers, November. 3-5 ft.



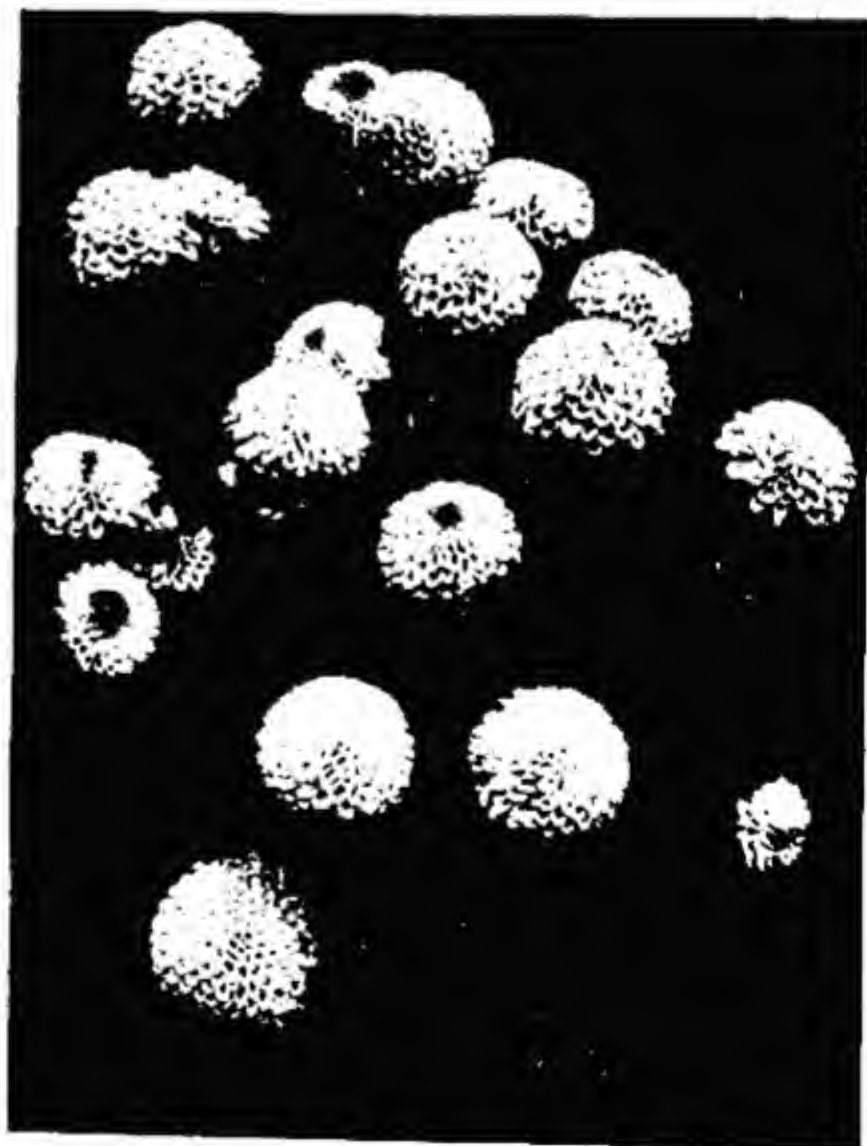
Chrysanthemum 'Mason's Bronze' (Single). Perennial, bronze flowers, November. 3-5 ft.



Chrysanthemum 'Rowlinda' (Anemone-centred). Perennial, orange flowers, November. 3-5 ft.



Chrysanthemum 'Sylvia Riley' (Early-flowering). Hardy perennial, pink flowers, September. 3-4 ft.



Chrysanthemum 'Little Dorrit' (Pompon). Hardy perennial, white flowers, October. 3-4 ft.



Chrysanthemum carinatum. Hardy annual, variously coloured flowers, summer. 2 ft.



Chrysanthemum maximum (Shasta Daisy). Hardy perennial, white flowers, summer. 1-2 ft.



Chrysanthemum parthenium (Feverfew). Hardy perennial, white flowers, summer. 2 ft.



Chrysanthemum rubellum. Hardy perennial, pink or lilac flowers, July-September. 2-3 ft.



Chrysogonum virginianum (Golden Star). Hardy perennial, yellow flowers, summer, 9 in.



Cimicifuga racemosa (Snake-root). Hardy perennial, white flowers, August, 3 ft.



Cirrhopetalum medusae. Epiphytic orchid, creamy white flowers, autumn.



Cissus discolor. Stove evergreen climber, mottled leaves, coral stems.



Cistus cyprius (Gum Cistus). Hardy shrub, white, chocolate-blotched flowers, June. 6 ft.



Citrus sinensis (Sweet Orange). Greenhouse fruiting shrub, white flowers, summer. 15 ft.



Cladrastis sinensis. Hardy tree, white pink-flushed flowers, July. 40-50 ft.



Clarkia elegans. Hardy annual, pink to purple flowers, summer. 1-4 ft.



Clematis alpina. Hardy climber, blue flowers, spring. 6 ft.



Clematis florida bicolor. Hardy climber, white and purple flowers, summer. 8-12 ft.



Clematis heracleifolia. Hardy perennial, purple flowers, summer. 2 ft.



Clematis integrifolia. Hardy perennial, blue flowers, August. 2 ft.



Clematis jouiniana. Hardy climber, white flowers, summer. 12 ft.



Clematis lanuginosa 'Nelly Moser'. Hardy climber, pale mauve, red-striped flowers, summer. 20 ft.



Clematis texensis. Hardy climber, scarlet flowers, summer. 20-30 ft.



Clematis tangutica. Hardy climber, yellow flowers, late summer. 10 ft.



Cleome spinosa 'Pink Queen' (*Spider Flower*). Half-hardy annual, pink flowers, summer. 3-4 ft.



Clerodendrum bungei. Hardy shrub, rose flowers August. 5 ft.



Clerodendrum trichotomum Fargesii. Hardy shrub, white flowers, September. 10-12 ft.



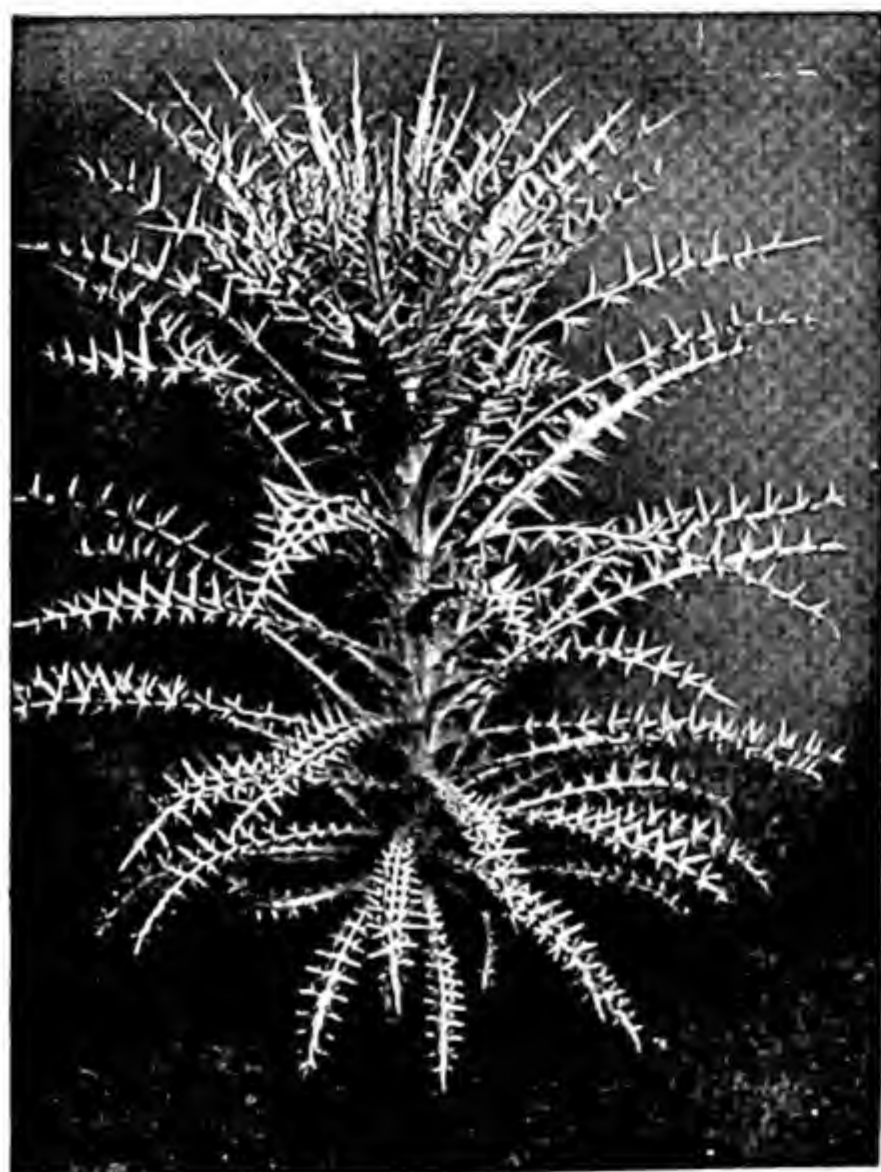
Clethra alnifolia (*Sweet Pepper Bush*). Hardy shrub, white flowers, August. 8-9 ft.



Clianthus puniceus (*Parrot's Bill*). Half-hardy climber, scarlet flowers, summer. 6 ft.



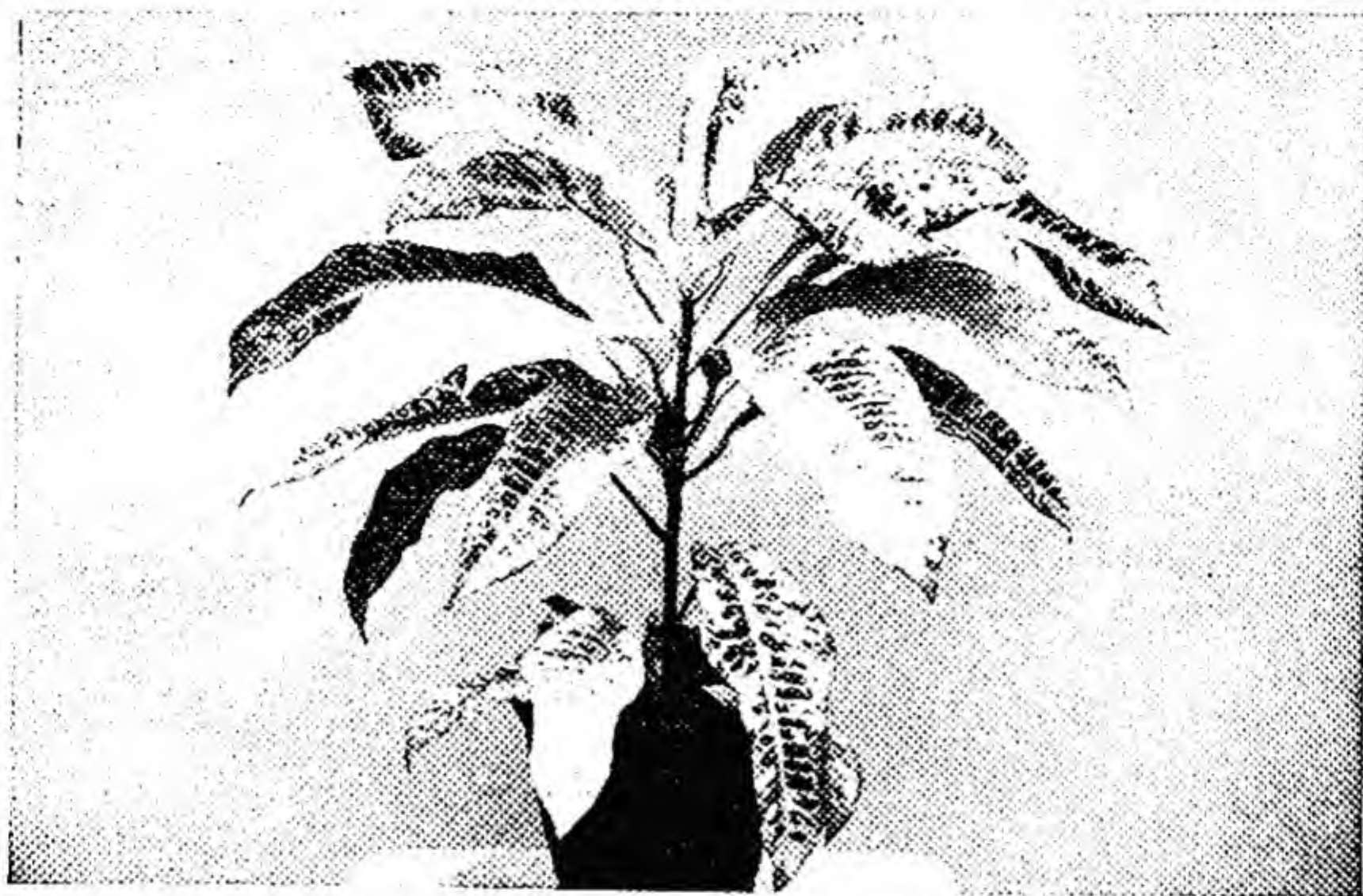
Clivia miniata (*Caffre Lily*). Greenhouse perennial yellow to red flowers, March to June. 1-1½ ft.



Cnicus benedictus (*Blessed Thistle*). Hardy annual, yellow flowers, summer. 1½-2 ft.



Cobaea scandens (*Cups and Saucers*). Half-hardy climber, purple or white flowers, summer. 10-30 ft.



Codiaeum variegatum. Stove foliage shrub, yellow, red and green leaves. 3-10 ft.



Codonopsis clematidea. Hardy perennial, blue flowers, summer. 1 ft.



Coelogyne cristata. Stove epiphytic orchid, white and yellow flowers, spring.



Coix lacryma-jobi (*Job's Tears*). Half-hardy annual grass, grey pearly seeds 2-3 ft.



Colchicum autumnale (*Autumn Crocus*). Hardy corm, purple flowers, September. 8 in.



Coleus blumei. Greenhouse foliage plant, yellow and purple and green variegated leaves. 1½-2 ft.



Colletia armata. Hardy shrub, white flowers, September. 10 ft.



Collinsia heterophylla. Hardy annual, purple and white flowers, summer. 1 ft.



Colocasia esculenta (Taro Root). Stove perennial foliage plant, edible tubers. 2-3 ft.



Columnnea Banksii. Stove trailing plant, scarlet flowers, May.



Colutea arborescens (Bladder Senna). Hardy shrub, yellow flowers, August. 10 ft.



Commelina coelestis. Half-hardy perennial, blue flowers, July. 1½ ft.



Conophytum truncatellum. Greenhouse succulent, yellow flowers, August to October. 4 in.



Convallaria majalis (Lily of the Valley). Hardy perennial, white flowers, spring. 6 in.



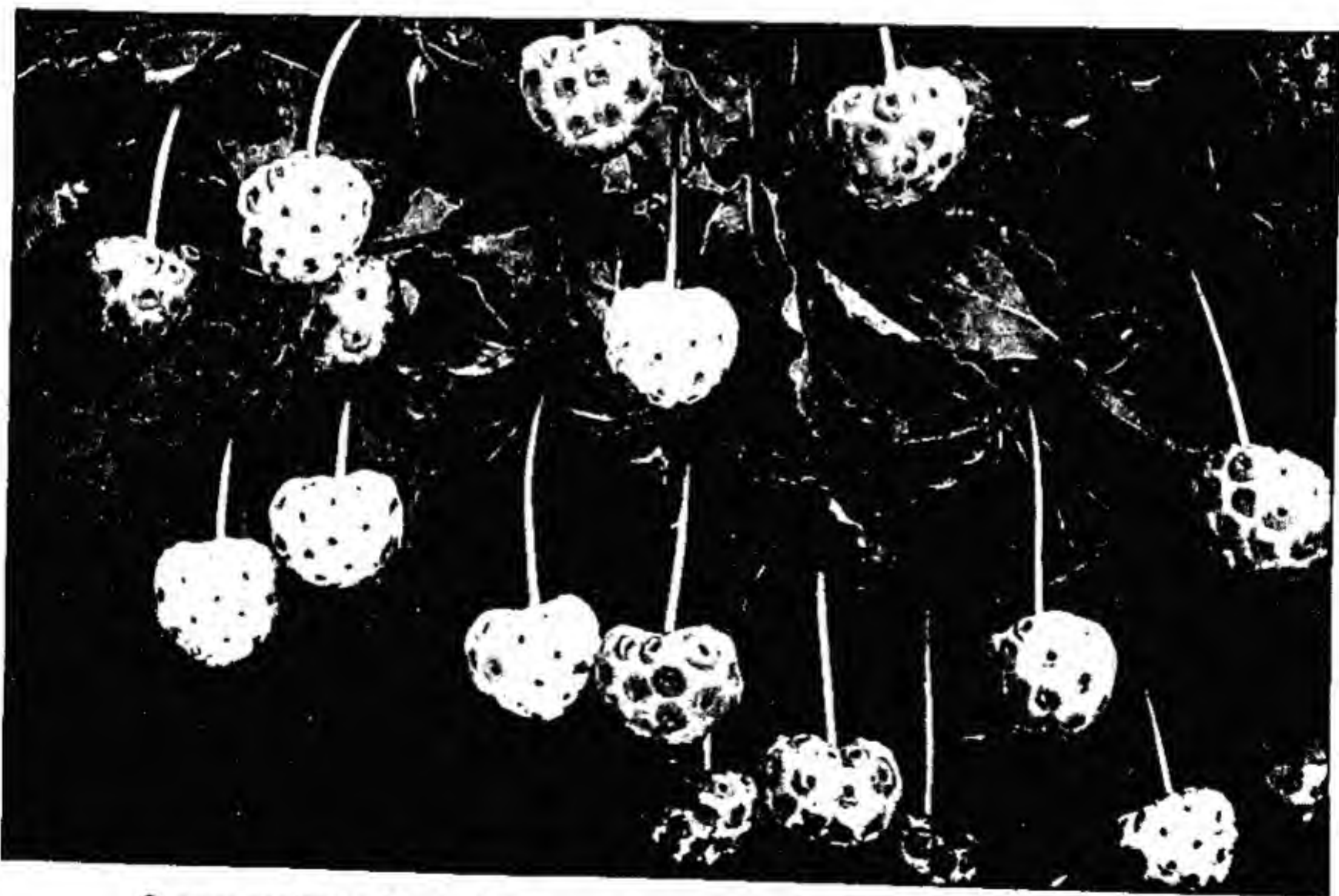
Convolvulus tricolor. Hardy annual, variously coloured flowers, summer. 1 ft.



Cordyline australis. Half-hardy tree, white flowers, summer. 15-40 ft. (in nature).



Coreopsis grandiflora. Hardy perennial, golden-yellow flowers, August. 2-3 ft.



Cornus capitata. Hardy shrub, creamy-white flowers. August, pinkish fruit. 15-20 ft.



Cornus nuttallii. Hardy shrub, creamy white flowers and white bracts, May. 15-25 ft.



Coronilla glauca. Slightly tender shrub, yellow flowers, May. 10-12 ft.



Cortaderia argentea (Pampas Grass). Hardy grass with decorative silver plumes, August and September. 10-15 ft.



Corydalis solida. Hardy perennial, purple flowers, April. 6 in.



Corylopsis spicata. Hardy shrub, yellow flowers, February and March. 4-6 ft.



Corylus avellana (Hazel Nut). Hardy tree, yellow catkins, February. 10-15 ft.



Cosmos bipinnatus (Mexican Aster). Half-hardy annual, variously coloured flowers, August. 3 ft.



Cotinus coggygria (*Smoke Tree*). Hardy shrub, coloured autumn foliage, purplish fruits, 15 ft.



Cotoneaster horizontalis. Hardy semi-evergreen shrub, scarlet fruits, winter. 2-8 ft.



Cotoneaster watereri. Hardy shrub, scarlet berries, winter. 15 ft.



Cotyledon teretifolia. Greenhouse evergreen succulent, yellow flowers, summer. 4-6 in.



Crambe cordifolia (Flowering Seakale). Hardy perennial, white flowers, May. 5 ft.



Crassula falcata. Greenhouse perennial, yellow and red flowers, summer. 6 in.



Crataegus orientalis. Hardy tree, white flowers, May, red fruits. 15 ft.



Crataegus oxyacantha (Hawthorn). Hardy tree, white flowers, May. 15-20 ft.



Crepis incana. Hardy rock plant, pink flowers, July 9-12 in.



Crinum powellii. Hardy bulb, rose flowers, summer. 3 ft.



Crocosmia crocosmaeflora (Montbretia). Hardy corm, orange to crimson flowers, summer. 2-3 ft.



Crocus vernus (Dutch Crocus). Hardy corm, variously coloured flowers, spring. 6 in.



Crowea saligna. Greenhouse evergreen shrub, pink flowers, summer. 1-2 ft.



Cryptanthus bivittatus. Stove epiphytic perennial, white flowers, August. 8-10 in.



Cryptomeria japonica elegans. Hardy conifer, bronze-red foliage, autumn. 20-30 ft.



Cucurbita maxima var. (Hubbard Squash). Half-hardy annual trailer, edible fruits (pumpkins).



Cunninghamia lanceolata. Hardy evergreen conifer. 70-150 ft.



Cuphea ignea. (Cigar Flower). Greenhouse plant, scarlet, black and white flowers, July. 1 ft.



Cupressus macrocarpa (*Monterey Cypress*). *Hardy conifer, 60-90 ft.*



Curtonus paniculatus. *Hardy corm, orange and red flowers, July to August. 4 ft.*



Cyananthus pedunculatus crenatus. *Hardy rock plant, blue flowers, June and July. 3-4 in.*



Cyathea dealbata (*Tree Fern*). Half-hardy evergreen tree fern. 10 ft.



Cycas revoluta (*Sago Palm*). Greenhouse plant with ornamental leaves. 6-8 ft.



Cyclamen neapolitanum. Tuberous hardy perennial, rose or white flowers, July to October. 4 in.



Cyclamen persicum. Greenhouse tuber, white, purple or rose flowers, winter. 12 in.



Cymbidium hybrid 'Ethel Ward'. *Epiphytic orchid, yellow, brown-spotted flowers, autumn.*



Cynara scolymus (*Globe Artichoke*). *Hardy perennial, purple flowers, July. 5 ft.*



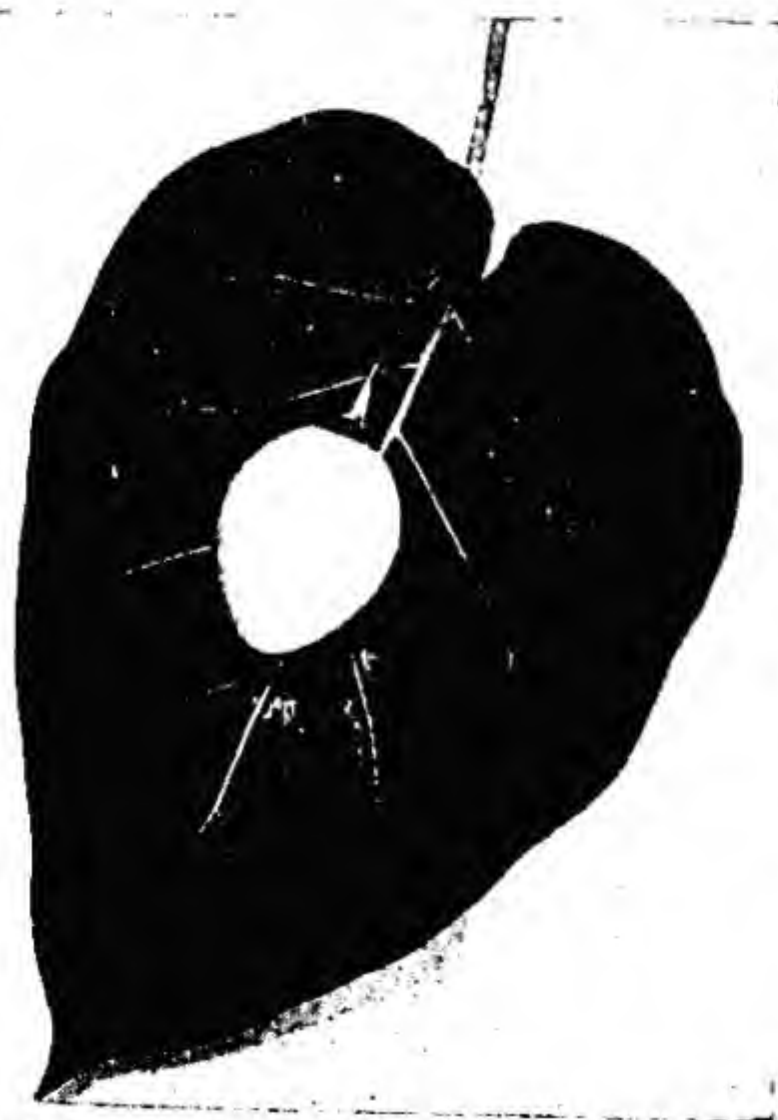
Cynoglossum amabile. *Hardy biennial, blue flowers, June. 2 ft.*



Cynorchis compacta. *Terrestrial orchid, white flowers, early spring.*



Cyperus alternifolius (*Umbrella Plant*). Greenhouse foliage plant. 1-2 ft.



Cyphomandra betacea (*Tree Tomato*). Greenhouse shrub, purple flowers, edible fruits. 8-10 ft.



Cypripedium reginae. Hardy perennial orchid. white and purple flowers, spring. 1½-3 ft.



Cyripedium pubescens. Hardy terrestrial orchid, greenish yellow flowers, early summer. 1½-2 ft.



Cyrtanthus flanaganii. Greenhouse bulb, yellow flowers, summer. 9 in.



Cyrtomium falcatum (Holly Fern). Greenhouse fern, dark green glossy fronds. 2-3 ft.



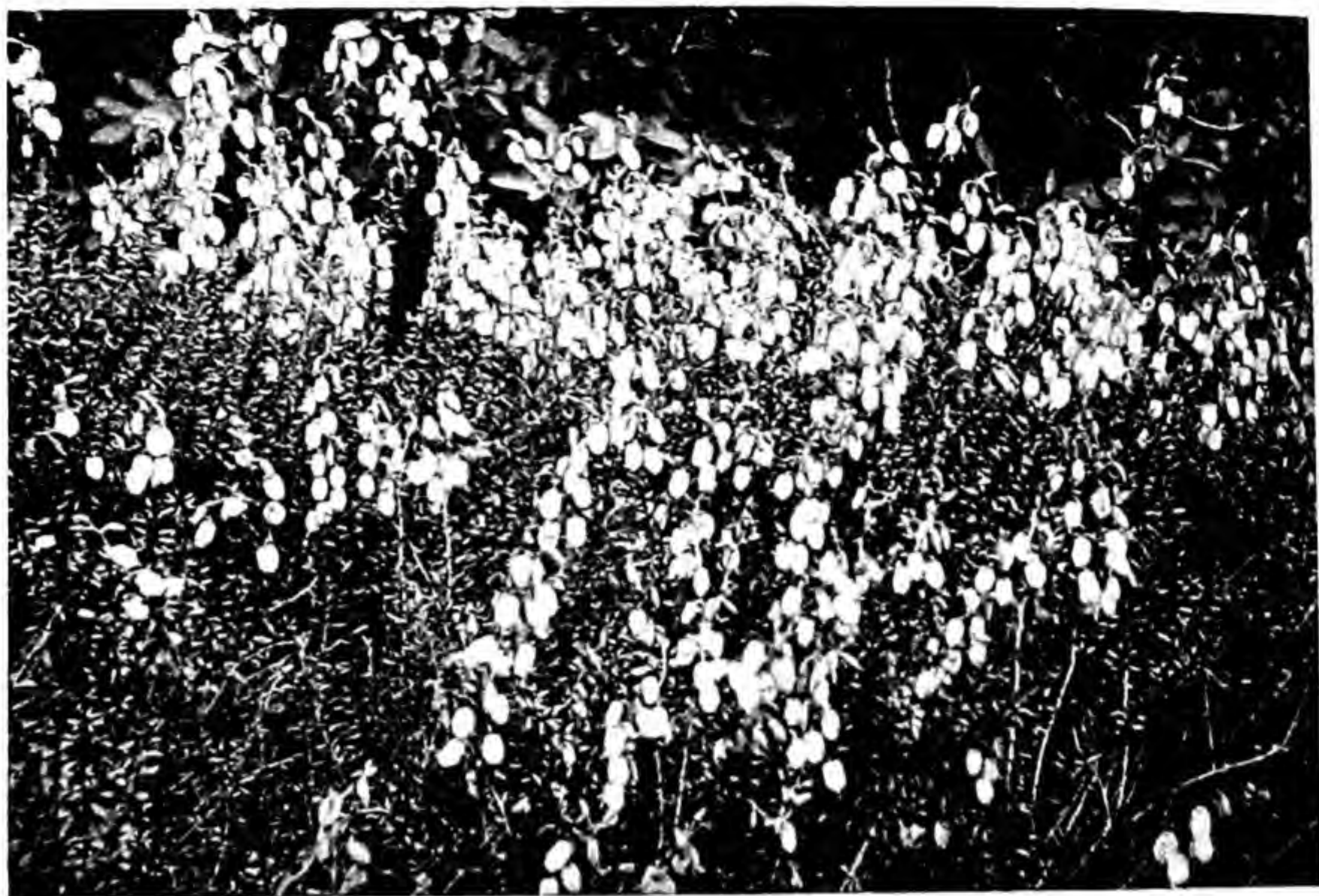
Cystopteris fragilis (Bladder Fern). Hardy deciduous fern. 6-8 in.



Cytisus scoparius andreanus. Hardy shrub, yellow and dark crimson flowers, summer. 5-10 ft.



Cytisus kewensis. Hardy prostrate shrub, creamy-white flowers, May. 1 ft.



Daboecia cantabrica (*Irish Heath*). Hardy shrub, purple flowers, July. $1\frac{1}{2}$ ft.



Dahlia 'Coltness Hybrids' (*Bedding*). Half-hardy perennial, variously coloured flowers, summer. 2 ft.



Dahlia 'Giraffe' (*Orchid-flowered*). Half-hardy perennial, buff, spotted rosy-crimson and yellow, autumn. 3 ft.



Dahlia 'Actinia' (*Anemone-flowered*). *Half-hardy perennial, bright yellow flowers, autumn. 3 ft.*



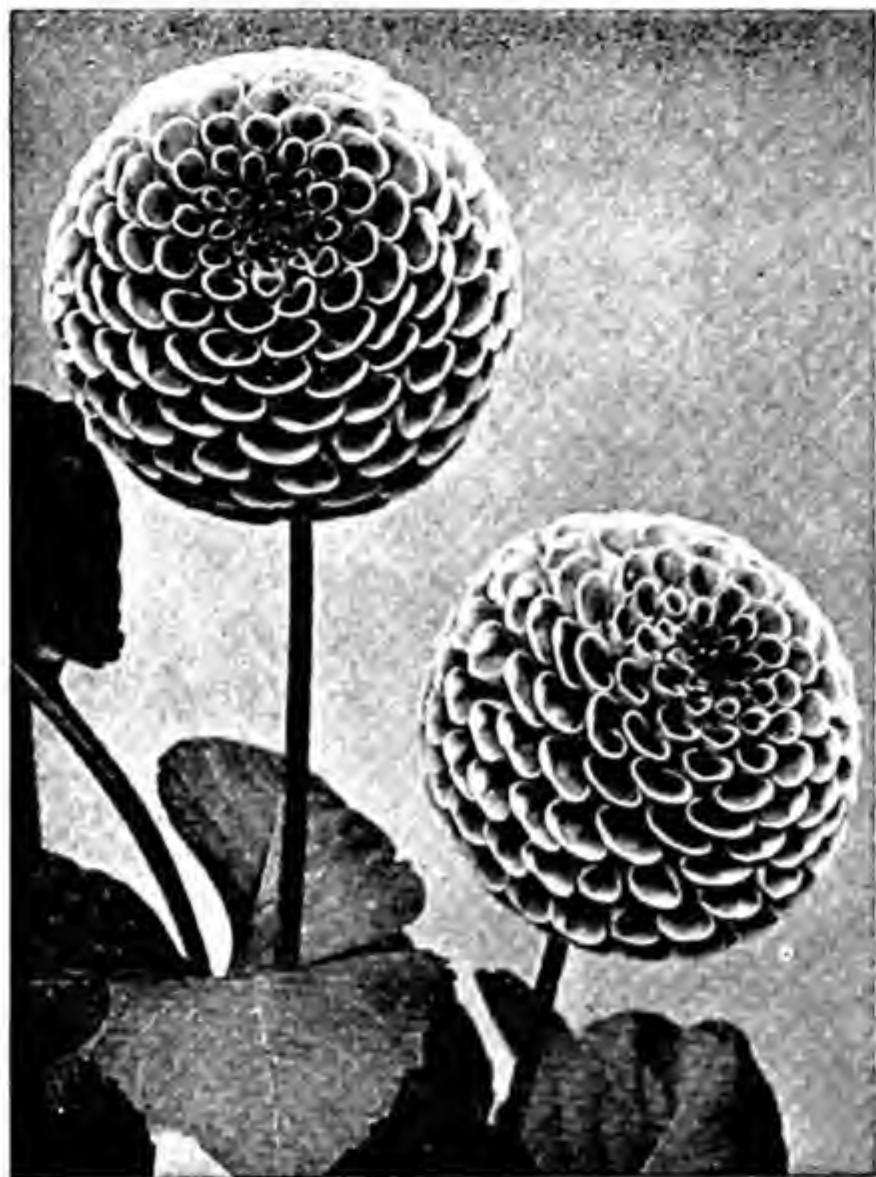
Dahlia vars (*Peony-flowered*). *Half-hardy perennial, variously coloured flowers, autumn. 3-5 ft.*



Dahlia 'Colonel William Ogg' (*Large Decorative*). *Half-hardy perennial, cream flowers. 3½ ft.*



Dahlia 'Blushes' (*Small Decorative*). *Half-hardy perennial, rose-pink flowers, autumn. 3½ ft.*



Dahlia 'David Johnson' (*Show*). *Half-hardy perennial, salmon flowers. 3½ ft.*



Dahlia 'Willo's Violet' (*Pompon*). *Half-hardy perennial, violet flowers. 3½ ft.*



Dahlia 'Pink Flamingo' (*Cactus*). *Half-hardy perennial, rose-pink flowers. 4 ft.*



Dahlia 'Len's Delight' (*Collerette*). *Half-hardy perennial, vermillion suffused orange, rose-tipped yellow 'collar'. 3 ft.*



Danaë racemosa (Alexandrian Laurel). Hardy shrub, greenish-white flowers and red berries. 2-3 ft.



Daphne blagayana. Hardy evergreen shrub, white flowers, March and April. 9-12 in.



Daphne mezereum (Mezereum). Hardy shrub, purple or white flowers. February. 3 ft.



Darlingtonia californica. Hardy insectivorous plant, yellow and green flowers, April. 1 ft.



Datisca cannabina (*False Hemp*). Hardy perennial, greenish-white flowers, summer. 3-6 ft.



Datura suaveolens. Half-hardy shrub, white flowers, August. 8-10 ft.



Davallia canariensis (*Hare's Foot Fern*). Greenhouse evergreen fern. 1½ ft.



Davidia involucrata "Ghost Tree". Hardy tree, large creamy-white bracts, May. 40-65 ft.



Decaisnea fargesii. Hardy shrub, yellowish-green flowers, blue fruits. 7-10 ft.



Delosperma echinatum. Greenhouse succulent, yellow flowers, August. 1 ft.



Delphinium elatum 'Mrs Hargreaves'. Hardy perennial, lilac flowers, June. 5 ft.



Delphinium nudicaule. Hardy perennial, red flowers, summer. 1½ ft.



Dendrobium nobile. Epiphytic orchid, white, rose and purple flowers, winter and spring.



Dendromecon rigidum (Tree Poppy). Half-hardy shrub, yellow flowers, summer. 2-10 ft.



Dentaria enneaphylla. Hardy perennial, creamy-white flowers, April and May. 9-12 in.



Desfontainea spinosa. Half-hardy evergreen shrub, scarlet and yellow flowers, summer. 6 ft.



Desmodium tiliifolium. Hardy shrub, lilac to deep pink flowers, August to October. 2-4 ft.



Deutzia longifolia. Hardy shrub, purple-rose flowers, June. 4-6 ft.



Dianthus alpestris. Hardy rock plant, pink flowers, summer, 6 in.



Dianthus barbatus (*Sweet William*). Hardy perennial, variously coloured flowers, summer, 1-2 ft.



Dianthus caryophyllus (*Border Carnation*). Various colours, summer, 2 ft.



Dianthus caryophyllus (*Perpetual Flowering Carnation*). Various colours, all year, 5 ft.



Dianthus caryophyllus 'Fascination' (*Picotee*). White flowers, with purple edges, summer and winter.



Dianthus neglectus. Hardy rock plant, rose-coloured flowers, summer. 2 in.

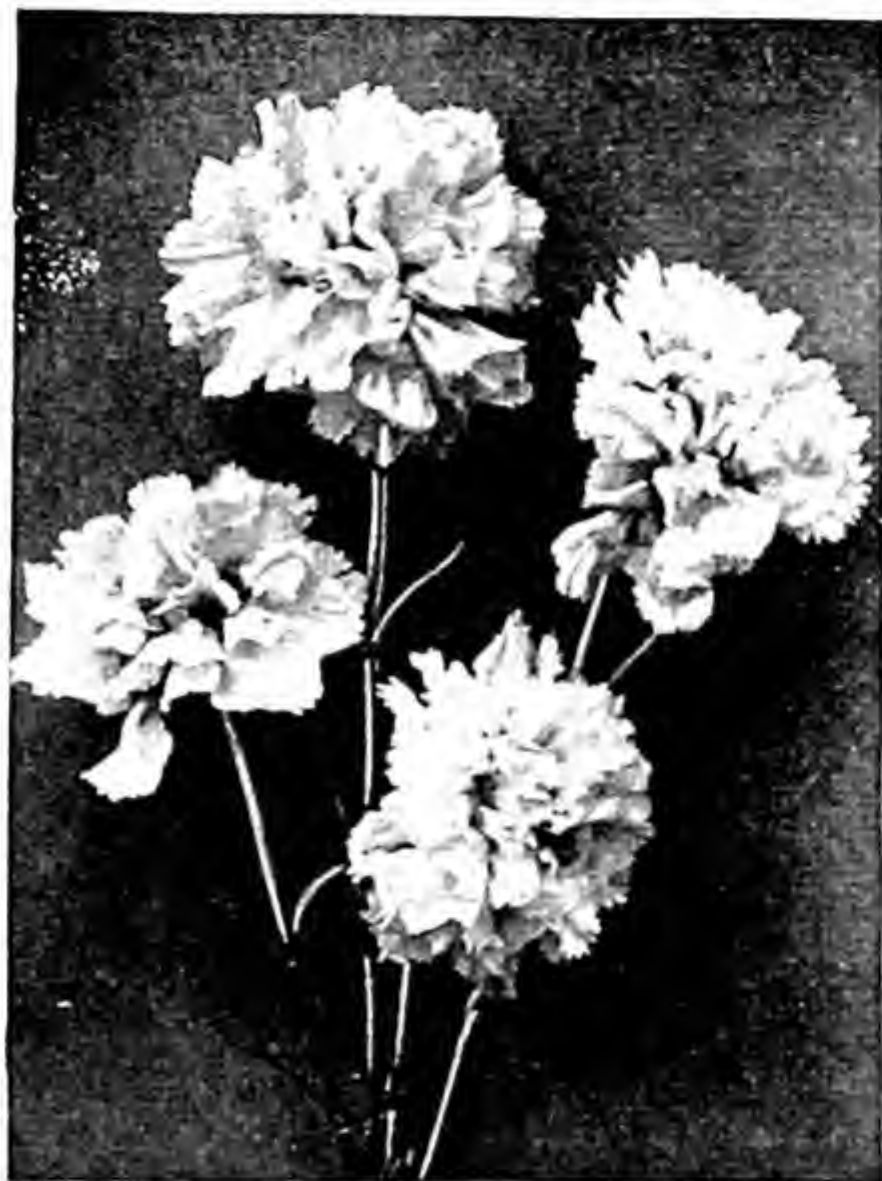


Dianthus plumarius (*Laced Pink*). Hardy perennial, variously coloured flowers, summer. 1-2 ft.

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Dianthus plumarius. (*Single Pink*). Hardy rock perennial, white to rose flowers, summer. 1-2 ft.



Dianthus plumarius flore pleno. (*Garden Pink*). Hardy perennial, various colours, summer. 1 ft.



Dianthus superbus (*Fringed Pink*). Hardy perennial, rose-coloured flowers, summer. 9-18 in.



Dicentra spectabilis (*Bleeding Heart*). Hardy perennial, rose and white flowers, early summer. 2 ft.



Dicksonia antarctica (*Tasmanian Tree Fern*).
Half-hardy tree fern. 18-20 ft.



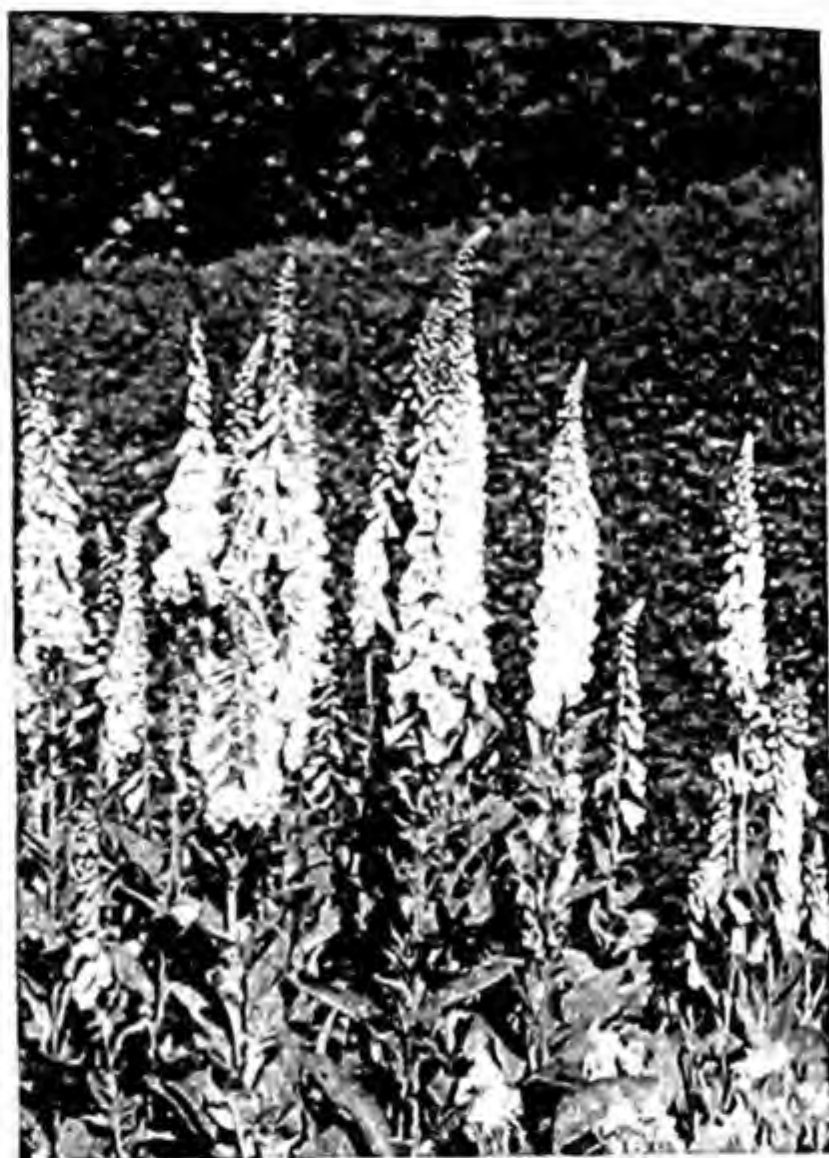
Dictamnus albus ruber (*Burning Bush*). Hardy perennial, purple flowers, May. 3 ft.



Dieffenbachia picta. Ornamental-leaved stove perennial, with green and yellow leaves. 4 ft



Dierama pulcherrimum (Wandflower). Hardy perennial, rose to crimson flowers, September. 3-4 ft.



Digitalis purpurea (Foxglove). Hardy biennial, variously coloured flowers, July to August. 3-5 ft.



Dimorphotheca aurantiaca. Half-hardy annual, orange-yellow flowers, summer. 6-12 in.



Dionaea muscipula (Venus's Fly Trap). Greenhouse perennial, white flowers, July and August. 6 in.



Dioscorea discolor. Warm greenhouse. Tuberous climbing perennial, ornamental leaves. 12 ft.



Diospyros kaki (Chinese Persimmon). Half-hardy tree, yellow edible fruits. 10 ft.



Disa uniflora. Terrestrial orchid, crimson flowers, summer. 2-3 ft.



Dizygotheca veitchii (False Aralia). Greenhouse shrub, narrow, serrated leaflets.



Dodecatheon meadia (*American Cowslip*). Hardy perennial, reddish, white or lilac flowers, spring. 1 ft.



Dombeya cayeuxii. Greenhouse evergreen tree, pink flowers. August. 10-15 ft.



Doronicum austriacum (*Leopard's Bane*). Hardy perennial, yellow flowers, spring. 1½ ft.



Douglasia laevigata. Hardy rock plant, rose-pink flowers, March to September. 1 in.



Draba bryoides imbricata. Hardy rock plant, yellow flowers, April and May. 2 in.



Dracaena sanderiana. Greenhouse evergreen foliage plant, leaves green and white. 2-5 ft.



Dracocephalum moldavica. Hardy annual, blue flowers, July. 1-1½ ft.



Dracunculus vulgaris (Dragon Arum). Hardy tuberous perennial, chocolate-brown flowers, July. 3 ft.



Drimys winteri. Half-hardy ornamental tree, ivory-white flowers, spring. 12-40 ft.



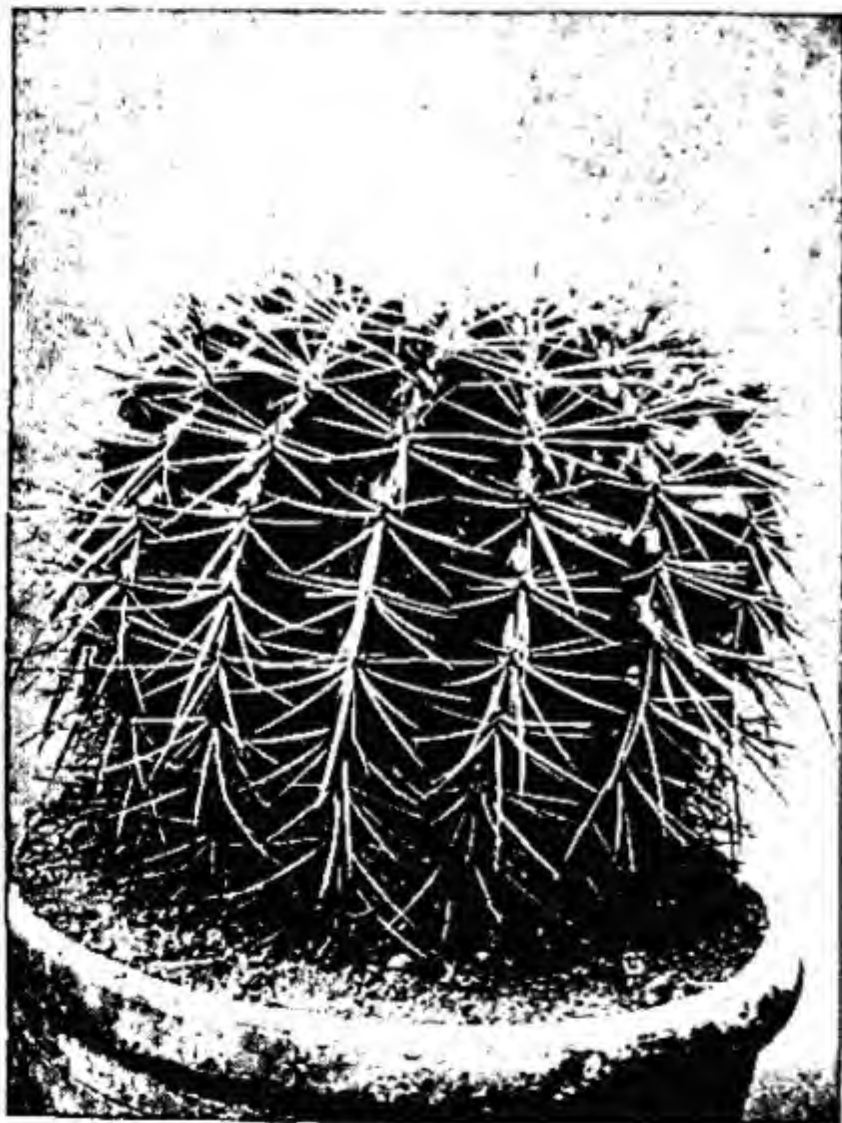
Dryas suendermanii. Hardy rock plant, white flowers, June. 3-4 in.



Eccremocarpus scaber. Half-hardy evergreen climber, scarlet and yellow flowers, summer. 20 ft.



Echinacea purpurea. Hardy perennial, purple flowers, August. 3 ft.



Echinocactus grusonii. Greenhouse cactus, red and yellow flowers, summer.



Echinops ritro (Globe Thistle). Hardy perennial, blue flowers, summer. 3 ft.



Echinopsis eyriesii. Greenhouse cactus, white flowers, summer. 4-6 in.



Echium wildpretii. Hardy biennial, rose flowers, summer. 3 ft.



Edraianthus pumilio. Hardy rock plant, violet flowers, June. 2-3 in.



Eichhornia azurea. Tender floating aquatic, lavender flowers, summer.



Elaeagnus pungens aurea. Hardy evergreen shrub, yellow and green foliage, 6 ft.



Embothrium coccineum (Firebush). Half-hardy tree, scarlet flowers, May and June, 10-30 ft.



Encephalartos altensteinii. Greenhouse evergreen plant, leathery leaves, 8 ft.



Enkianthus campanulatus. Hardy shrub, white or cream, red-tinged flowers, May, 20 ft.



Epacris longiflora splendens. Greenhouse shrub, crimson and white flowers, May and June. 2-4 ft.



Epidendrum prismatocarpum. Epiphytic orchid, yellowish spotted flowers, summer.



Epigaea intertexta 'Aurora'. Hardy creeping shrub, pink flowers, May.



Epilobium angustifolium 'Isobel'. (Rose Bay). Hardy perennial, rose flowers, July. 4-6 ft.



Epimedium youngianum niveum. Hardy rock plant, white flowers, April. 6 in.



Epipactis gigantea. Hardy terrestrial orchid, green and rose-red striped flowers, June. 3 ft.



Epiphyllum anguliger. Greenhouse cactus, yellow flowers, autumn. 1-2 ft.



Eranthis hyemalis (Winter Aconite). Hardy perennial, yellow flowers, January to March. 3-4 in.



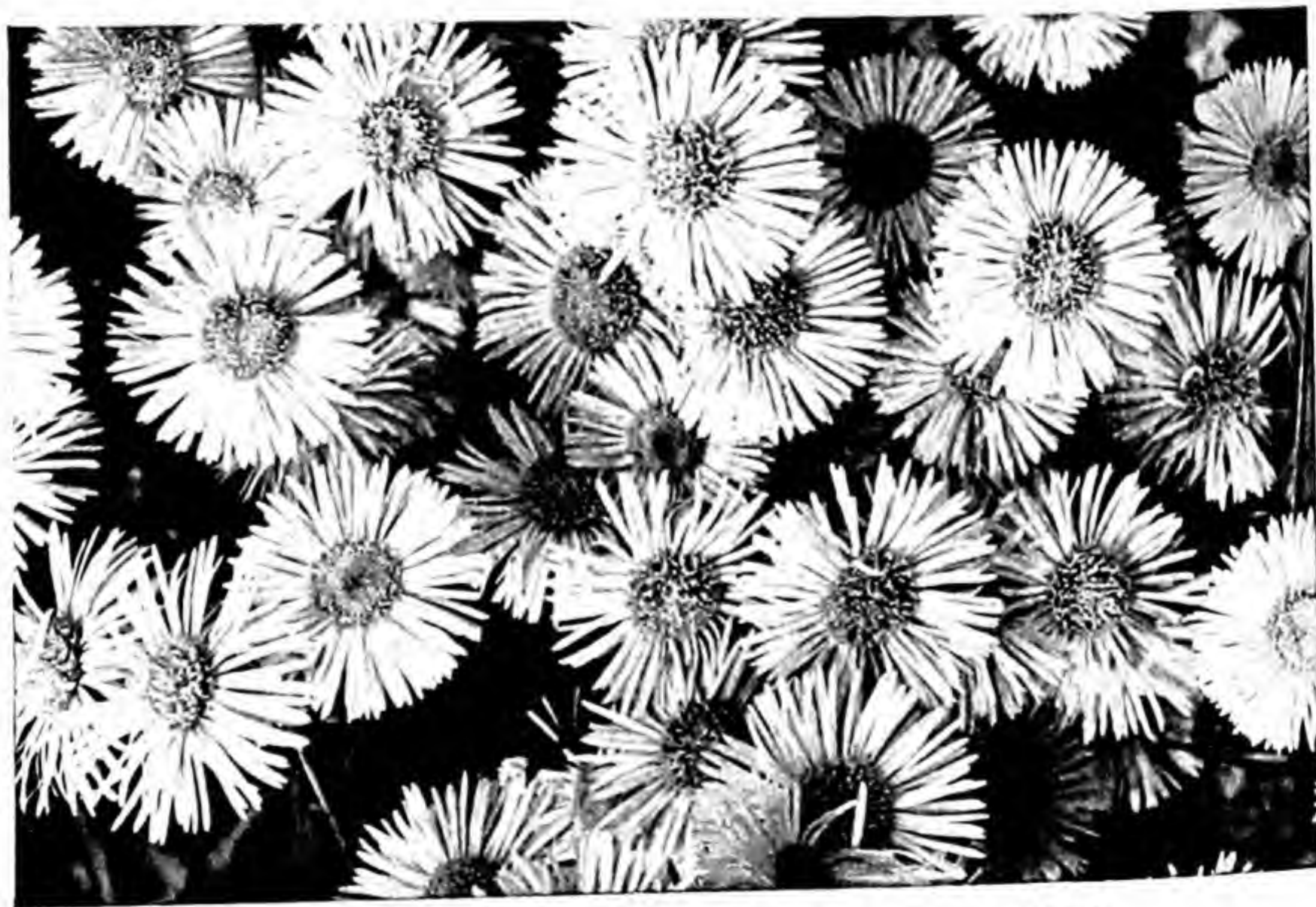
Eremurus himalaicus. Hardy perennial, pink flowers, summer. 6-8 ft.



Erica gracilis. Greenhouse shrub, white flowers, July to October. 1 ft.



Erica vagans (Cornish Heath). Hardy shrub, rosy-lilac flowers, July to October. 2 ft.



Erigeron speciosus. Hardy perennial, violet-blue flowers, summer. $1\frac{1}{2}$ -2 ft.



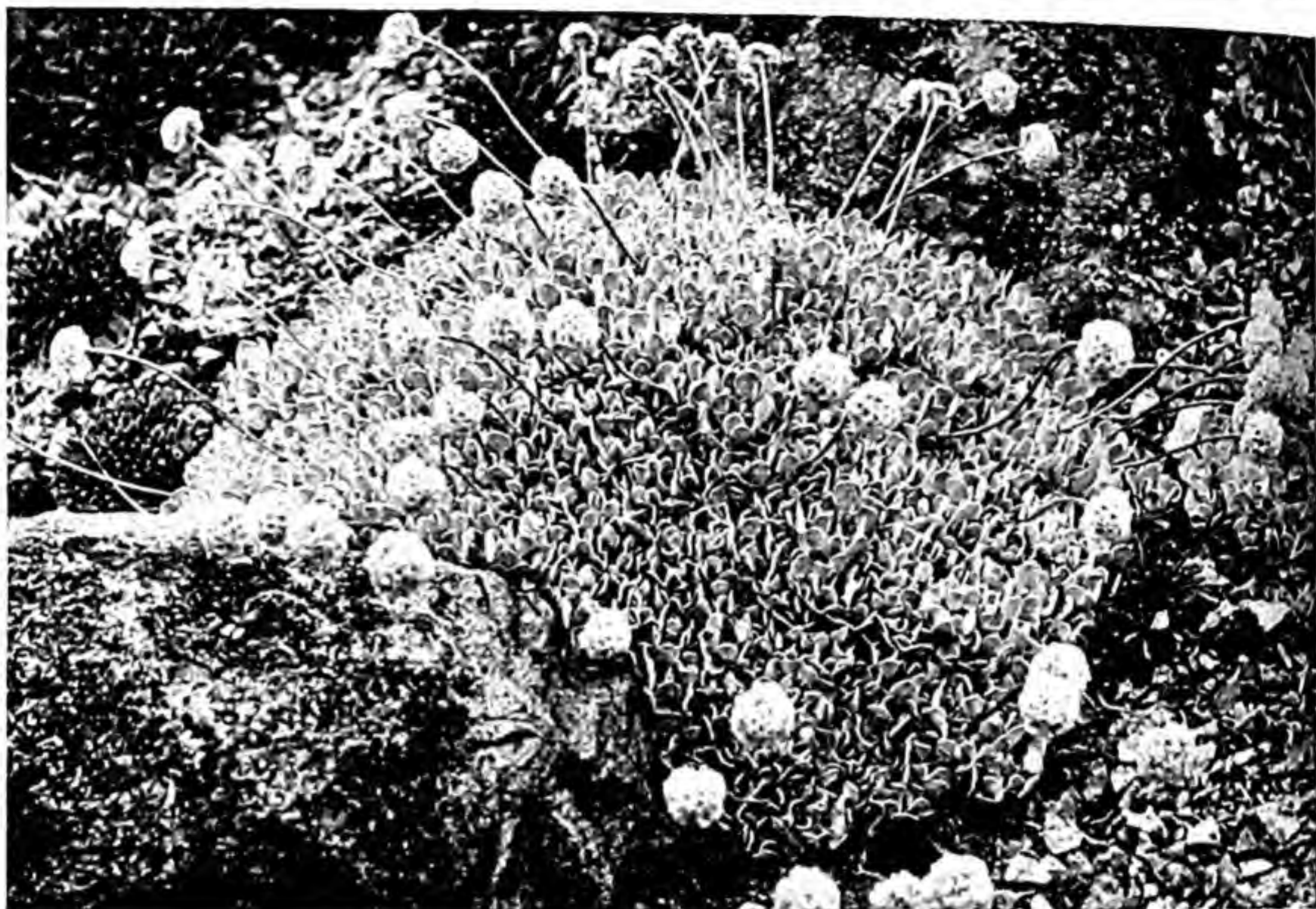
Erinacea anthyllis (*Hedgehog Broom*). Hardy shrub pale blue flowers, spring. 1 ft.



Erinus alpinus. Hardy rock plant, rose, crimson or white flowers, spring. 6 in.



Eriobotrya japonica. Half-hardy shrub, white flowers, summer. 10-30 ft.



Eriogonum ovalifolium. Hardy rock plant, yellow flowers turning purplish, summer. 3 in.



Eritrichium nanum. Hardy rock plant of difficult culture, blue flowers, summer. 2-3 in.



Erodium macradenum. Hardy rock plant, violet, flesh and purple flowers, summer. 6 in.



Eryngium tripartitum. Hardy perennial, blue flowers, summer. 2 ft.



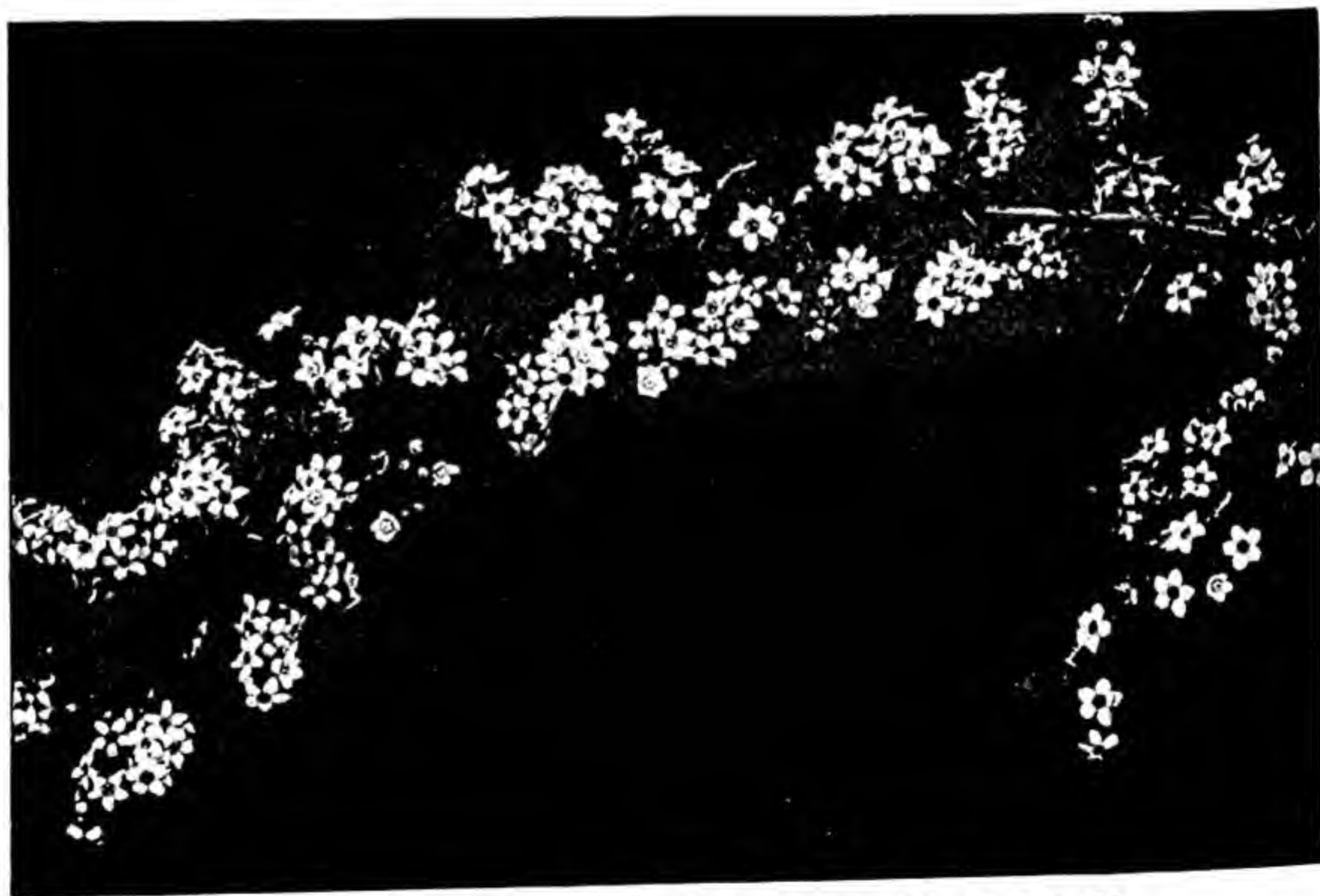
Erysimum asperum. Hardy biennial, orange or yellow flowers, spring and early summer. 1-2 ft.



Erythrina crista-galli (*Coral Tree*). Greenhouse shrub, scarlet flowers, June to August. 6-8 ft.



Erythronium dens-canis (*Dog's Tooth Violet*). Hardy bulb, rose flowers, spring. 6 in.



Escallonia langleyensis. Half-hardy shrub, rosy carmine flowers, June. 8 ft.



Eschscholtzia californica (*Californian Poppy*). Hardy annual, orange-yellow flowers, summer. 1-2 ft.



Eucalyptus globulus (*Blue Gum*). Half-hardy tree, yellow flowers. 120 ft.



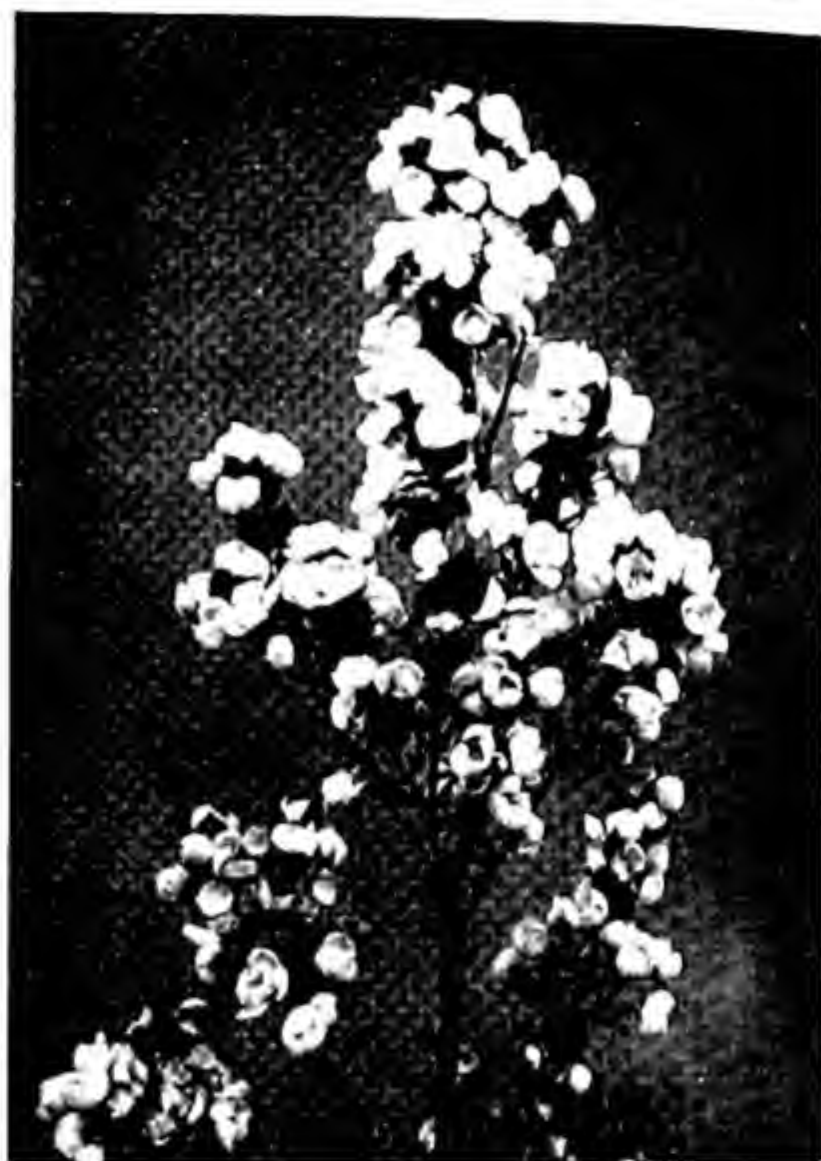
Eucharis grandiflora (*Amazon Lily*). Greenhouse bulb, white flowers, March to December, 1-2 ft.



Eucomis pallidiflora. Half-hardy bulb, greenish-white flowers, summer. 2 ft.



Eucryphia glutinosa. Hardy tree, white flowers, July and August. 20 ft.



Eugenia apiculata (Fruiting Myrtle). Greenhouse shrub, white flowers, summer. 20 ft.



Euonymus radicans. Evergreen creeping shrub, leaves sometimes variegated. 1-20 ft.



Euonymus yedoensis. Hardy shrub, pink fruit, autumn. 10 ft.



Eupatorium cannabinum plenum. Hardy perennial, reddish-purple flowers, July. 2-4 ft.



Euphorbia fulgens. Greenhouse, scarlet flowers, autumn and winter. 2-3 ft.



Euphorbia polychroma. Hardy perennial, yellow bracts, April. 1 ft.



Euphorbia pulcherrima (Poinsettia). Stove shrub, scarlet bracts, autumn. Up to 10 ft.



Exacum affine. Greenhouse biennial, bluish-lilac flowers, June to October, 6 in.



Exochorda racemosa (Pearl Bush). Hardy shrub, white flowers, May, 10 ft.



Fabiana imbricata (False Heath). Half-hardy shrub, white flowers, May, 8 ft.



Fagus sylvatica pendula (Weeping Beech). Hardy tree, 70-80 ft.



Fatsia japonica (*Japanese Aralia*). Hardy ever-green shrub, cream flowers, October. 6-15 ft.



Faucaria tigrina. Greenhouse succulent, yellow flowers. August to November. 3 in.



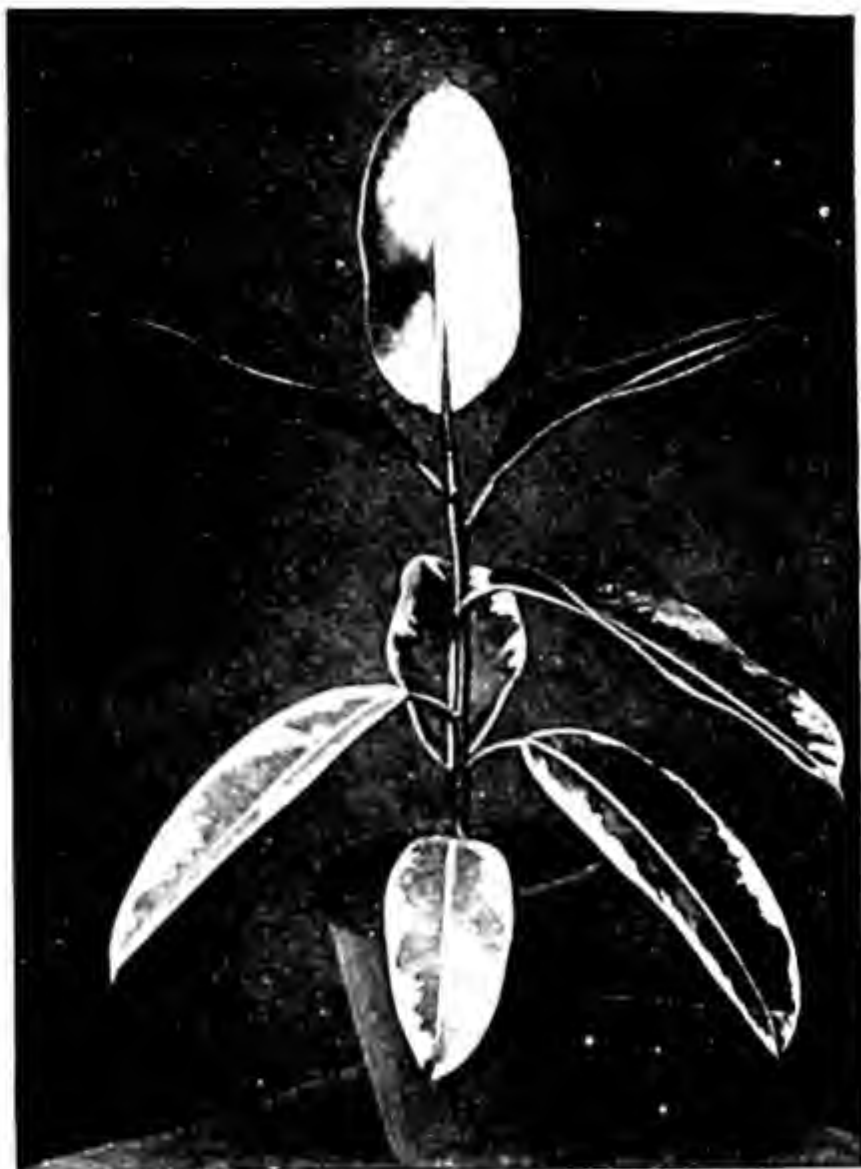
Feijoa sellowiana. Half-hardy tree, white and purplish flowers, autumn. 18 ft.



Felicia amelloides. Half-hardy sub-shrub, blue flowers, June to August. 1-1½ ft.



Festuca ovina glauca. Hardy perennial grass, bristly glaucous leaves, 6 in.



Ficus elastica variegata. Greenhouse plant, green or variegated leaves, 2-3 ft.



Filipendula vulgaris plena (Double Dropwort). Hardy perennial, white flowers, June, 2-3 ft.



Fittonia argyroneura. Greenhouse foliage plant, silver-veined leaves, 8 in.



Foeniculum vulgare (Fennel). Hardy perennial, yellow flowers, summer. 5 ft.



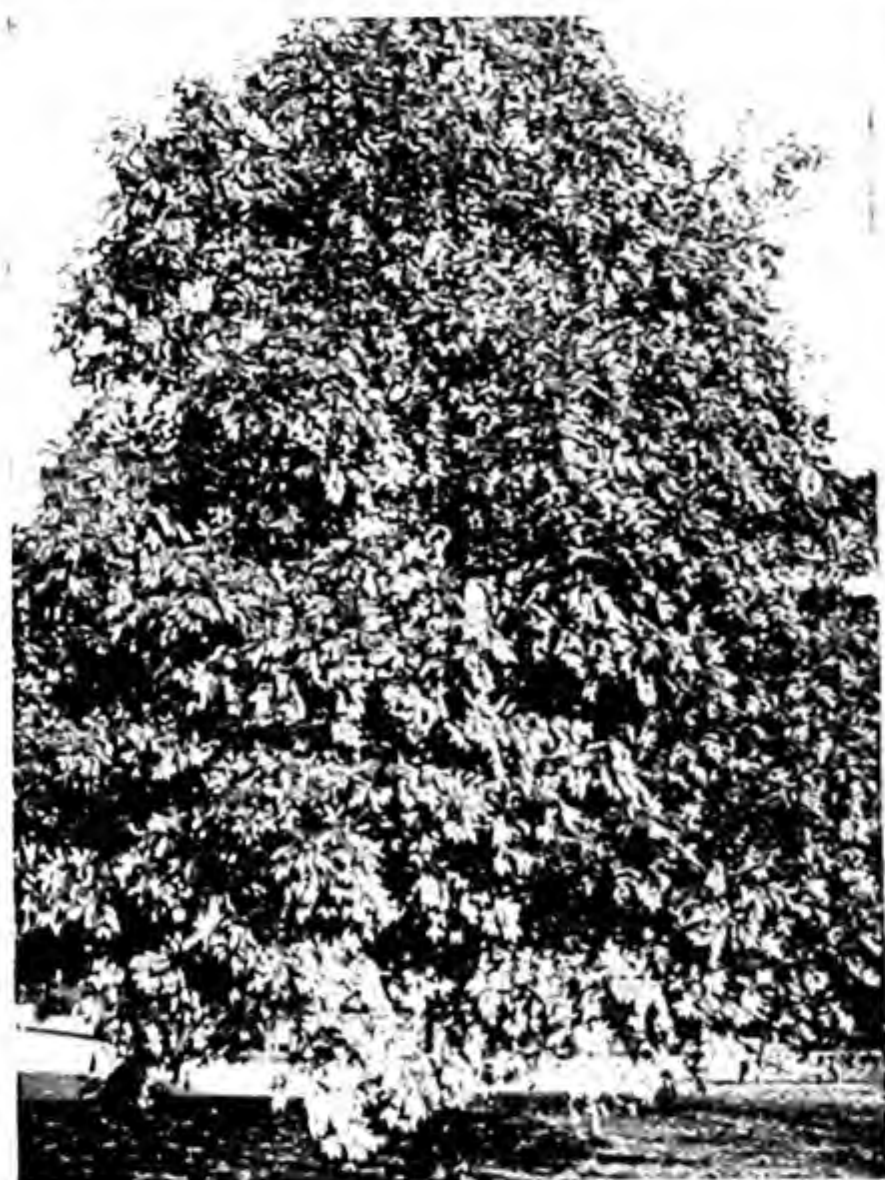
Forsythia spectabilis. Hardy shrub, yellow flowers, March-April. 10 ft.



Fothergilla monticola (American Witch-Hazel). Hardy shrub, white and yellow flowers, May. 6-8 ft.



Francoa ramosa (Bridal Wreath). Half-hardy perennial, white flowers, July and August. 2 ft.



Fraxinus ornus (Manna Ash). Hardy tree, white flowers, May. 50-65 ft.



Freesia refracta alba. Greenhouse bulb, white flowers, winter or spring. 1½ ft.



Fremontia californica. Half-hardy shrub, golden flowers, May to August. 10 ft.



Fritillaria imperialis (Crown Imperial). Hardy bulb, yellow or red flowers, May. 2-3 ft.



Fritillaria meleagris (*Snake's Head*). *Hardy bulb, purple, yellow and white flowers, May. 1-1½ ft.*



Fuchsia hybrid '*Jeanne d'Arc*'. *Half-hardy shrub, red and white flowers, summer. 3 ft.*



Fuchsia magellanica. *Slightly tender shrub, scarlet and purple flowers, July. 10-20 ft.*



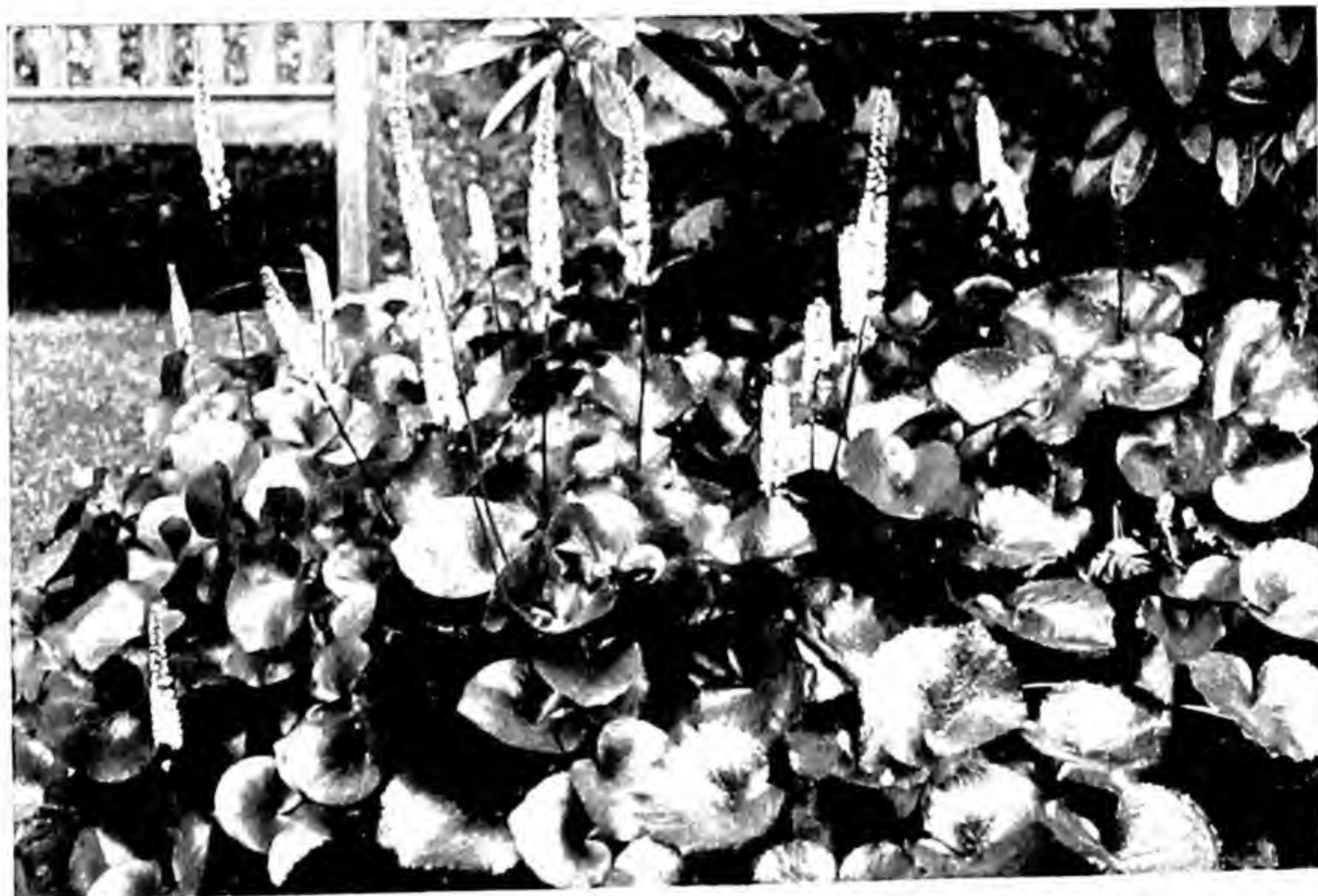
Fuchsia procumbens. *Half-hardy trailing shrub, yellow, blue and crimson flowers, crimson fruits.*



Gaillardia aristata 'The Prince'. Hardy perennial, yellow and red flowers, autumn. 2-3 ft.



Galanthus plicatus (Crimean Snowdrop). Hardy bulb, white and green flowers, late winter. 10-12 in.



Galax aphylla (Wand Plant). Hardy perennial, white flowers, July. 1 ft.



Galega officinalis (Goat's Rue). Hardy perennial, blue or white flowers, summer. 3-5 ft.



Galtonia candicans (Summer Hyacinth). Hardy bulb, white flowers, summer. 2-3 ft.



Gardenia grandiflora. Greenhouse evergreen tree, white flowers, summer. To 20 ft.



Garrya elliptica. Hardy shrub, greenish-yellow catkins, November to February. 10-12 ft.



Gaultheria miqueliana. Slightly tender dwarf shrub, white or pink flowers, June, white berries. 1 ft.



Gaura lindheimeri. Hardy annual, white and rose flowers, July to October. 3-4 ft.



Gazania splendens. Half-hardy perennial, orange, black and white flowers, summer. 1 ft.



Genista hispanica (*Spanish Broom*). Hardy shrub, yellow flowers, May-June. 1-2 ft.



Gentiana asclepiadcea alba. Hardy perennial white flowers, July and August. 2 ft.



Gentiana sino-ornata. Hardy rock plant, blue flowers, autumn. 3 in.



Geranium grandiflorum. Hardy rock plant, blue flowers, June to September. 6 in.



Gerbera jamesonii (Barberton Daisy). Tender perennial, orange-scarlet flowers, summer. 18 in.



Gesneria cardinalis. Greenhouse perennial, scarlet and white flowers, autumn. 12-18 in.



Geum chiloense. Hardy perennial, scarlet, orange or yellow flowers, summer. 2 ft.



Gevuina avellana. Greenhouse tree, white flowers, coral red fruits, 40 ft. (in nature).



Gilia androsacea. Hardy annual, white to violet flowers, summer, 1 ft.



Gillenia trifoliata (*Indian Physic*). Hardy perennial, red and white flowers, July, 2 ft.



Ginkgo biloba (*Maidenhair Tree*). Hardy coniferous tree, 60-80 ft.



Gladiolus colvillii. Half-hardy corm, crimson and white flowers, early summer. 2 ft.



Gladiolus 'Tivoli'. Half-hardy corm, delicate soft pink flowers, late summer. 4 ft.



Gladiolus primulinus 'Maid of the Mist'. Half-hardy corm, golden-yellow flowers, August. 3 ft.



Gladiolus tristis. Half-hardy corm, red and yellow flowers, July. 1 ft.



Glaucium flavum (*Horned Poppy*). Hardy biennial, yellow flowers, summer. 1-2 ft.



Glecoma hederacea variegata (*Ground Ivy*). Hardy perennial, blue flowers summer. Trailing.



Gleditsia triacanthos (*Honey Locust*). Hardy deciduous tree. 30-60 ft.



Gleichenia rupestris. Greenhouse fern, climbing stems. 6 ft.



Globularia incanescens. Hardy rock plant, blue flowers, summer. 6 in.



Gloriosa rothschildiana. Greenhouse climber, red and yellow flowers, summer. 6-8 ft.



Godetia grandiflora. Hardy annual, red, pink or white flowers, summer. 6-24 in.



Grevillea robusta (Silk Bark Oak). Greenhouse shrub, orange flowers, summer. 10-20 ft.



Griselinia littoralis. Half-hardy shrub, green flowers, spring. 20-30 ft.



Gunnera manicata. Hardy perennial waterside plant, leaves 5-10 ft. in diameter



Gypsophila paniculata (Chalk Plant). Hardy perennial, white or pink flowers, summer. 1-4 ft.



Habenaria dilatata leucostachys. Hardy terrestrial orchid, white flowers, summer. 3-3½ ft.



Haberlea rhodopensis virginalis. Hardy rock plant, white flowers, May. 6 in.



Haemanthus puniceus (Blood Lily). Greenhouse bulb, orange flowers, summer. 1 ft.



Halesia carolina (Snowdrop Tree). Hardy tree, white flowers, May. 15-20 ft.



Hamamelis mollis (Witch-Hazel). Hardy shrub, yellow flowers, January and February. 10 ft.



Hebe salicifolia (Veronica). Hardy shrub, white flowers, summer. 6-10 ft.



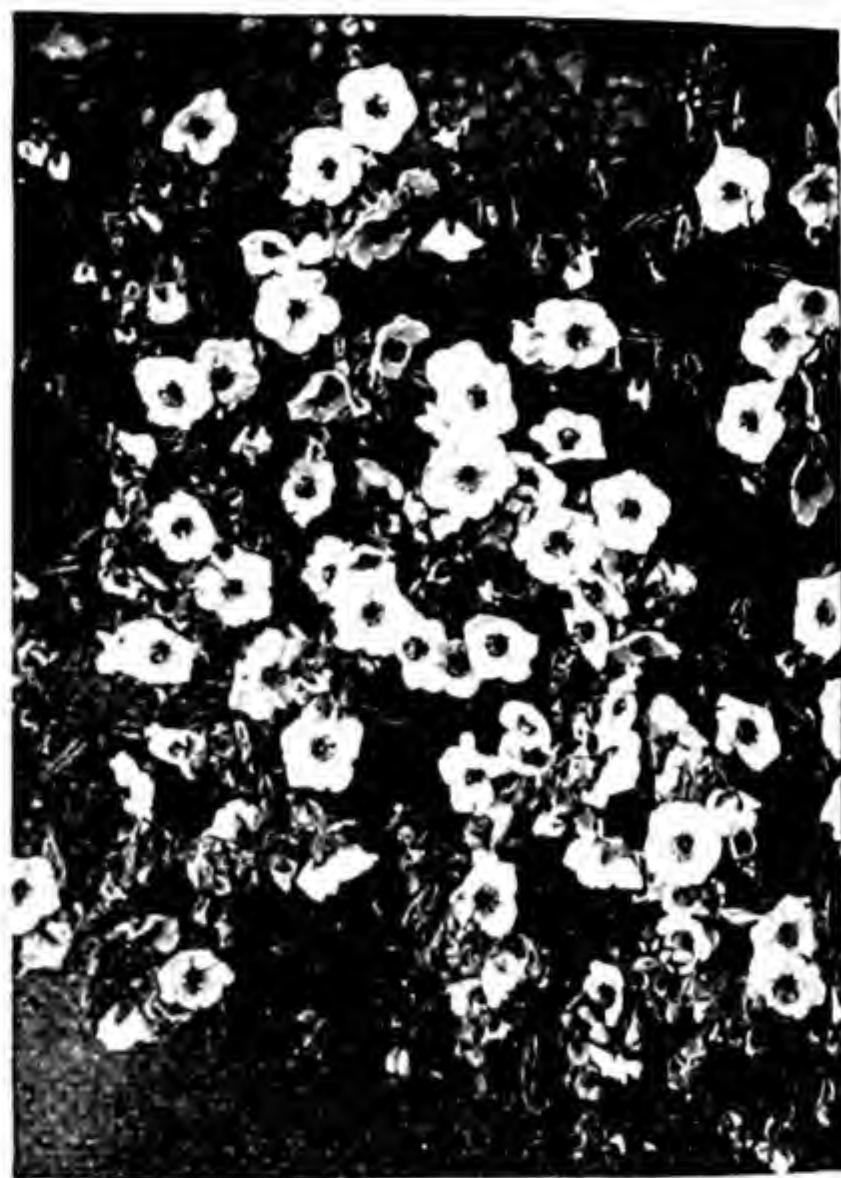
Hedera colchica dentata variegata (Ivy). Hardy climber, gold mottled leaves, up to 10. in. across.



Hedychium gardnerianum. Greenhouse perennial, lemon-yellow flowers, summer. 4 ft.



Helenium autumnale (Sneezeweed). Hardy perennial, yellow flowers, July to October, 3-5 ft.



Helianthemum apenninum (Sun Rose). Hardy shrub, white flowers, summer. 1½ ft.



Helianthus decapetalus maximus (Sunflower). Hardy perennial, yellow flowers, summer. 4 ft.



Helichrysum bracteatum (Immortelle). Hardy annual, variously coloured flowers, summer. 3-4 ft.



Helicodiceros muscivorus (*Dragon's Mouth*). Hardy perennial, purplish-brown flowers. 2 ft.



Heliconia aureo-striata. Greenhouse perennial, green and yellow leaves. 3 ft.



Heliophila linearifolia. Hardy annual, blue flowers, summer. 1½-2 ft.



Heliopsis helianthoides (*North American Ox-eye*). Hardy perennial, yellow flowers, autumn. 5 ft.



Heliotropium arborescens. Greenhouse plant, blue or white flowers, spring to winter. 1-6 ft.



Helipterum roseum. Hardy annual, pink 'everlasting' flowers, summer. 2 ft.



Helleborus orientalis (Lenten Rose). Hardy perennial, white to maroon, February to May, 1-2 ft.



Hemerocallis aurantiaca (Day Lily). Hardy perennial, yellow to crimson flowers, summer. 3 ft.



Heracleum mantegazzianum (Cow Parsnip). Hardy perennial, white flowers, summer. 7-9 ft.



Hesperis matronalis (Sweet Rocket). Hardy perennial, white or lilac flowers, May to June. 2-3 ft.



Heuchera sanguinea (Alum Root). Hardy perennial, red flowers, summer. 1½ ft.



Hibiscus rosa-sinensis (Blacking Plant). Greenhouse shrub, crimson flowers, summer. 25 ft.



Hibiscus trionum. Hardy annual, white and violet flowers, summer. 2 ft.



Hidalgoa wercklei (Climbing Dahlia). Half-hardy perennial, scarlet and yellow flowers, summer.



Hieracium aurantiacum (Hawkweed). Hardy perennial, orange-red flowers, summer. 1-1½ ft.



Hippeastrum puniceum (Barbados Lily). Stove bulb, red, pink or white flowers, summer. 3 ft.



Hippocrepis comosa (*Horseshoe Vetch*). Hardy trailing perennial, yellow flowers, May to August.



Hippophaë rhamnoides (*Sea Buckthorn*). Hardy shrub, silver foliage, orange berries. 20 ft.



Hoheria populnea. Slightly tender shrub, white flowers, September and October. 30 ft.



Houlletia wallisii. Epiphytic orchid, yellow, chocolate and crimson flowers, summer. 2 ft.



Houstonia caerulea (Bluets). Hardy perennial, blue flowers, May to July. 4-6 in.



Howea belmoreana (Syn. *Kentia Belmoreana*). Greenhouse palm. 6-10 ft.



Hoya carnosa (Wax Flower). Greenhouse climber, pink and white flowers, summer. 10-12 ft.



Humulus lupulus (Hop). Hardy perennial climber, green flower clusters. 10-15 ft.



Hunnemannia fumariifolia. Half-hardy perennial, yellow flowers, August. 2 ft.



Hutchinsia alpina. Hardy perennial, white flowers, spring. 2-3 in.



Hyacinthus orientalis. Hardy bulb, variously coloured flowers, spring. 1-1½ ft.



Hydrangea macrophylla. Half-hardy shrub, white, pink or blue flowers, summer. 4-6 ft.



Hydrangea petiolaris (Climbing Hydrangea). Hardy climber, white flowers, June and July. 50 ft.



Hydrocleys nymphoides. Half-hardy aquatic perennial, yellow flowers, July.



Hymenanthera crassifolia. Hardy shrub, yellow flowers, white berries. 3-4 ft.



Hymenocallis ovata. Greenhouse bulb, white flowers, autumn. 1 ft.



Hypericum calycinum (Rose of Sharon). Hardy shrub, yellow flowers, all summer. 1-1½ ft.



Hypoxis stellata elegans. Greenhouse perennial corm, white flowers, spring. 6-12 in.



Hyssopus officinalis albus (Hyssop). Hardy evergreen shrub, white flowers, June to September. 1-2 ft.



Iberis umbellata (Candytuft). Hardy annual, white to purple flowers, summer. 1 ft.



Idesia polycarpa. Hardy tree, orange or green flowers, red berries. 10-15 ft.



Ilex aquifolium baccifera (Yellow Fruited Holly). Hardy shrub or tree, yellow berries. 30 ft.



Impatiens sultani. Stove perennial or house plant, scarlet flowers, summer. 1 ft.



Impatiens balsamina (Balsam). Greenhouse annual, red or white flowers, summer. $1\frac{1}{2}$ –2 ft.



Incarvillea delavayi. Hardy perennial, rose flowers, summer. $2\frac{1}{2}$ ft.



Indigofera gerardiana. Hardy shrub, rosy-purple flowers, July to September. 4–8 ft.



Inula royleana. Hardy perennial, golden-yellow flowers, August and September. 2 ft.



Ipomoea leari (Blue Dawnflower, Morning Glory). Greenhouse climber, blue flowers, summer, 10 ft.



Iresine herbstii. Stove perennial, maroon and crimson leaves, 1 ft.



Iris gatesii. Hardy perennial, grey purple and white flowers, May. 1-1½ ft.



Iris germanica (Flag Iris). Hardy perennial, variously coloured flowers, May-June. 2-4 ft.



Iris kaempferi. Hardy perennial, white, lilac or purple flowers, June and July. $1\frac{1}{4}$ – $2\frac{1}{2}$ ft.



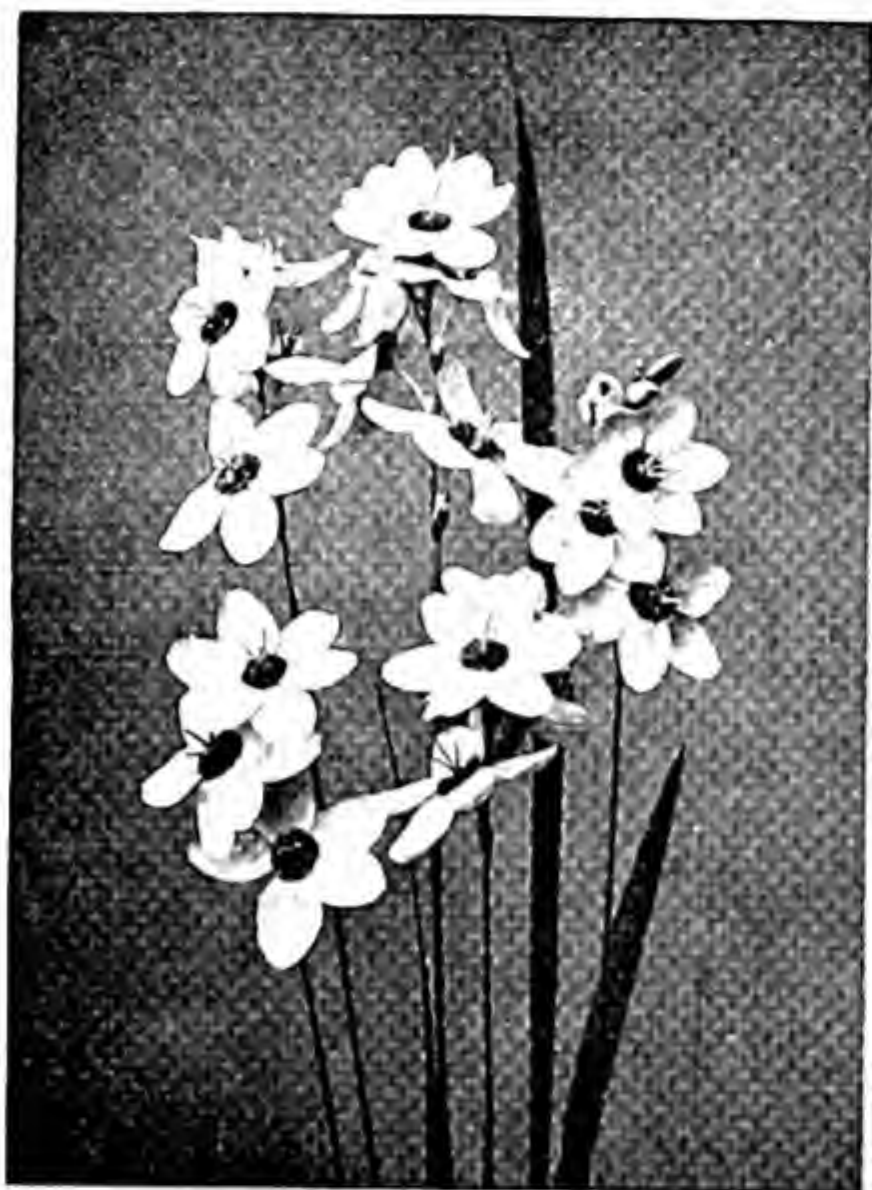
Iris reticulata. Hardy bulb, violet, purple and yellow flowers, February. 6 in.



Iris unguicularis (Algerian Iris). Hardy perennial, lavender-blue flowers, winter. 1 ft.



Itea ilicifolia. Hardy shrub, greenish-white flowers, August. 8–15 ft.



Ixia viridiflora. Half-hardy bulb, green flowers, spring. 1 ft.

Ixiolirion montanum. Half-hardy biennial, blue flowers, June. 1 ft.



Ixora coccinea. Stove shrub, orange scarlet flowers, summer. 3-4 ft.



Jacaranda acutifolia. Greenhouse evergreen tree, blue flowers. 10 ft.



Jacobinia carnea. Greenhouse perennial, flesh-coloured flowers, late summer. 3-4 ft.



Jasminum nudiflorum (Winter Jasmine). Hardy shrub, yellow flowers, winter. 12 ft.



Jeffersonia diphylla (Twin Leaf). Hardy rock plant, white flowers, spring. 6 in.



Juglans regia (Walnut). Hardy tree, silvery-grey bark. 60-90 ft.



Juniperus communis compressa. Dwarf conifer. 6 in.-3 ft.



Kalanchoë blossfeldiana. Greenhouse perennial succulent, scarlet flowers, summer. 1 ft.



Kalmia latifolia (Calico Bush). Hardy shrub, rose-pink flowers, June. 6-10 ft.



Kennedyya rubicunda. Greenhouse evergreen twining plant, dark red flowers, May. 10-15 ft.



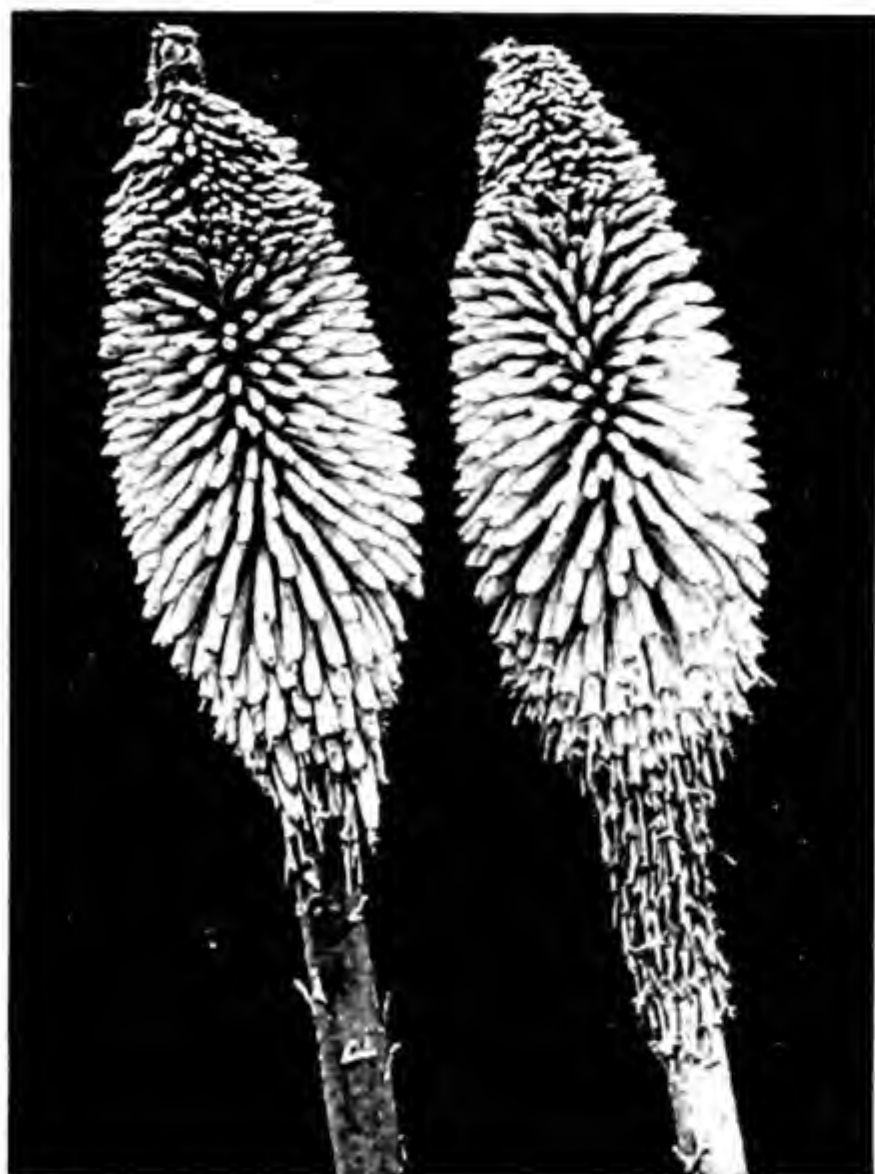
Kerria japonica pleniflora. Hardy shrub, golden-yellow double flowers, May. 6-10 ft.



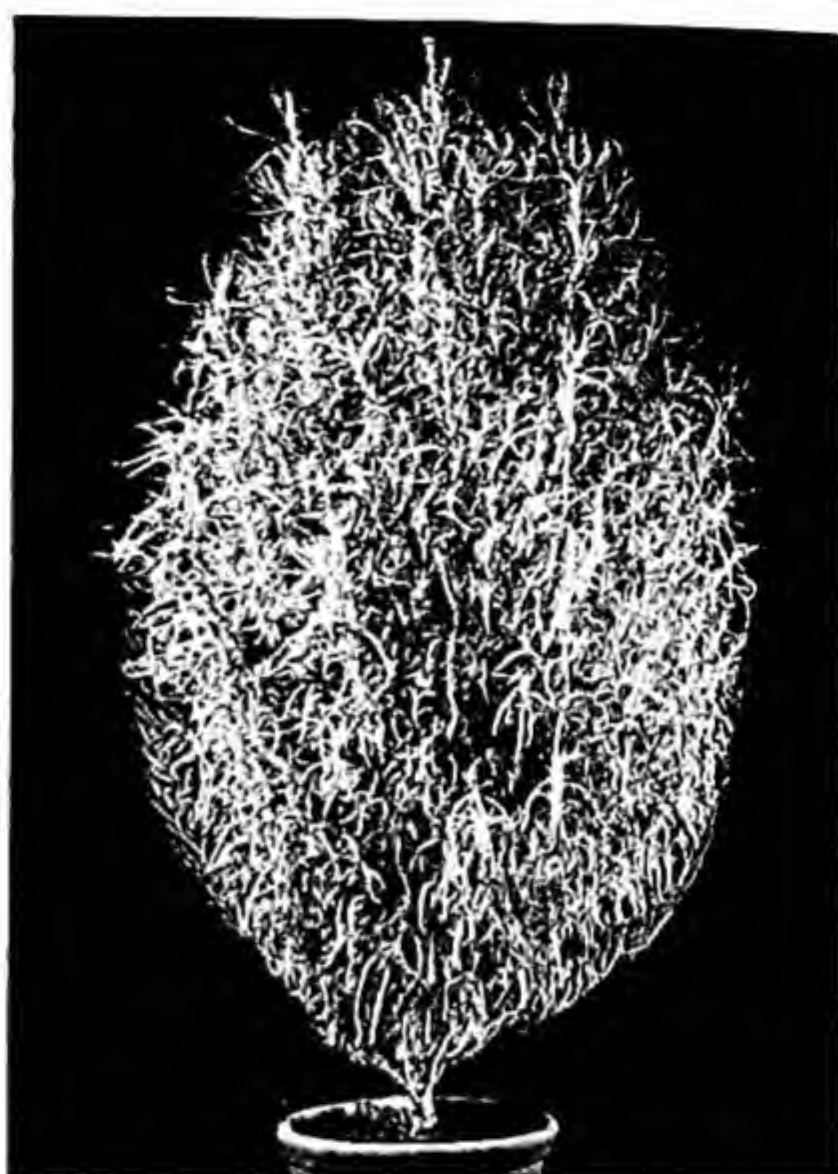
Kirengeshoma palmata. Hardy perennial, yellow flowers, autumn. 3-4 ft.



Kleinia articulata (Candle Plant). Greenhouse perennial, yellow flowers, summer. 1½ ft.



Kniphofia uvaria (Red Hot Poker). Hardy perennial, red and yellow flowers, autumn. 4-5 ft.



Kochia scoparia trichophila (Summer Cypress). Hardy annual, crimson-purple autumn foliage. 2-3 ft.



Koelreuteria paniculata. Hardy tree, yellow flowers, July. 30-40 ft.



Kolkwitzia amabilis (Beauty Bush). Hardy shrub, pink yellow-throated flowers, May and June. 5 ft.



Laburnum watereri. Hardy tree, yellow flowers, June. 20-25 ft.



Lachenalia tricolor Nelsonii. Greenhouse bulb, yellow flowers, spring. 1 ft.



Laelia pumila major. Epiphytic orchid, rose to purple flowers, winter.



Laeliocattleya 'Aconcagua'. Epiphytic orchid, white and purple flowers, summer.



Lagurus ovatus. Hardy annual decorative grass, white seed heads, summer. 1 ft.



Lampranthus brownii. Greenhouse succulent orange-red flowers, summer. 1 ft.



Lantana camara. Half-hardy plant, orange, yellow or red flowers, summer. 4 ft.



Lapageria rosea (Chilean Bellflower). Half-hardy climber, rose flower, summer. 15-20 ft.



Lapeirousia cruenta. Hardy bulb, crimson flowers, summer. 1 ft.



Larix griffithii (Himalayan Larch). Hardy deciduous conifer. 40-60 ft.



Lasthenia glabrata. Hardy annual, yellow flowers, summer. 1 ft.



Lathyrus latifolius (Everlasting Pea). Hardy climbing perennial, rose flowers, summer. 8-10 ft.



Lathyrus odoratus (Sweet Pea). Hardy annual, variously coloured flowers. 6-10 ft.



Laurus nobilis (Sweet Bay). Hardy evergreen shrub. 20-40 ft.



Lavandula officinalis (*Lavender*). Hardy shrub, blue flowers, July and August. 1-4 ft.



Lavatera trimestris. Hardy annual, rose flowers, summer. 3-4 ft.



Layia elegans (*Tidy Tips*). Hardy annual, yellow and white flowers, summer. 1 ft.



Ledum groenlandicum (*Labrador Tea*). Hardy evergreen shrub, white flowers. April. 3 ft.



Leea amabilis. Greenhouse shrub, bronze-green, white-striped leaves. 3 ft.



Leonotis leonurus (Lion's Ear). Half-hardy evergreen shrub, orange-scarlet flowers, autumn. 3-5 ft.



Leontopodium alpinum (Edelweiss). Hardy perennial, yellow flowers, white bracts, summer. 6 in.



Leptospermum scoparium (South Sea Myrtle). Half-hardy shrub, white flowers, May and June. 6 ft.



Leptosyne stillmannii. Hardy annual, yellow flowers, summer, 1 ft.



Leucocoryne ixioides. Half-hardy bulb, blue flowers, May and June. 1-1½ ft.



Leucojum vernal (Spring Snowflake). Hardy bulb, white and green flowers, March. 1 ft.



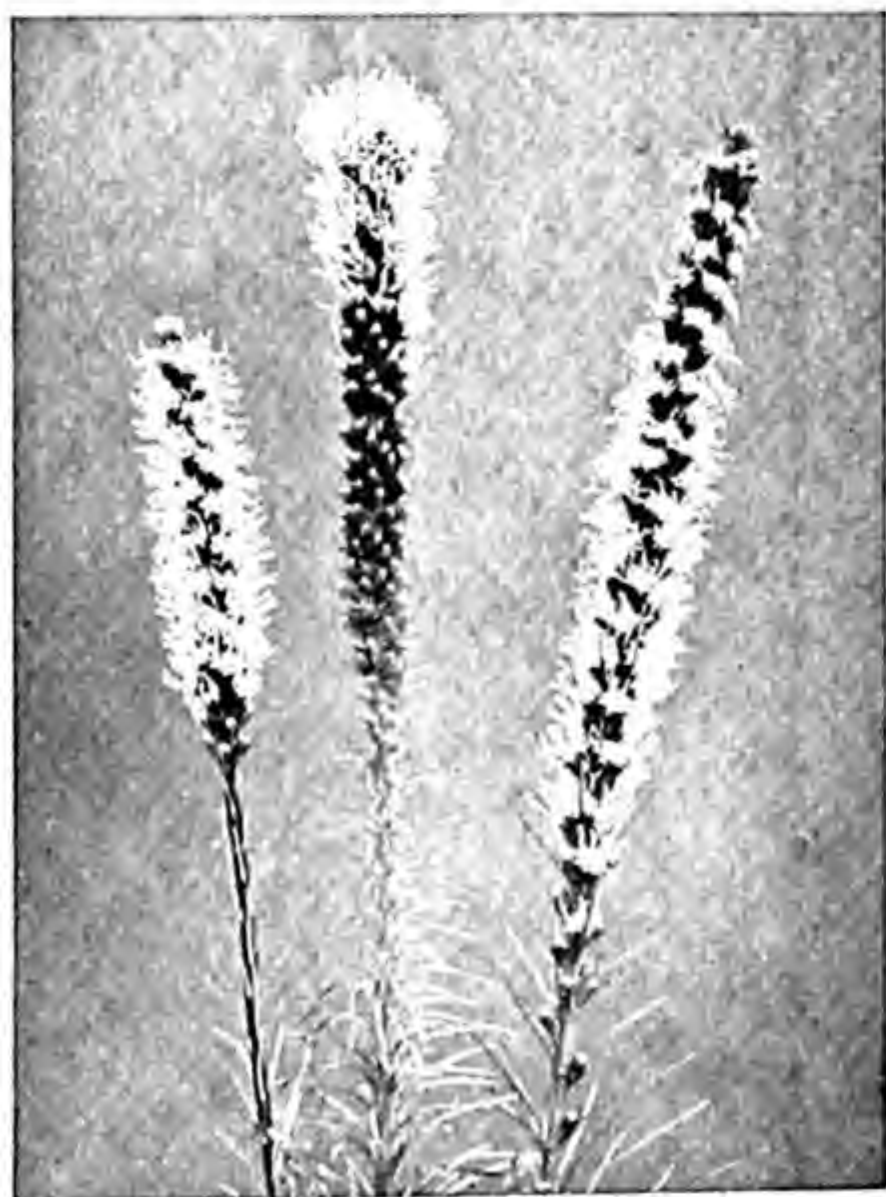
Leucothoe catesbaei. Hardy shrub, white flowers, May. 3-6 ft.



Lewisia howellii. Hardy rock plant, apricot-pink flowers, early summer. 6 in.



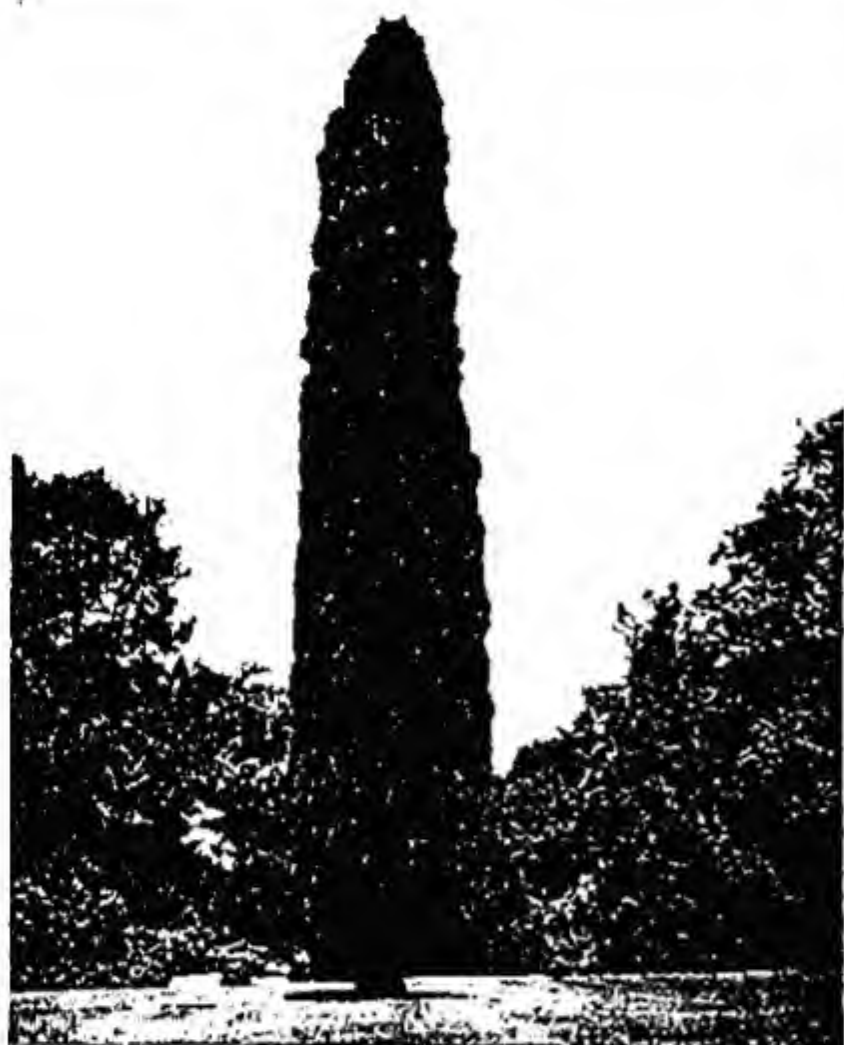
Leycesteria formosa (Himalayan Honeysuckle). Hardy shrub, maroon and white flowers, summer. 6-8 ft.



Liatris pycnostachya (Button Snake-root). Hardy perennial, purple flowers, August. 3-4 ft.



Libertia ixioides. Hardy perennial, white flowers June. 2 ft.



Libocedrus decurrens (*Incense Cedar*). *Hardy conifer 50-100 ft.*



Ligularia dentata clivorum. *Hardy perennial orange-yellow flowers, July to September, 4-5 ft.*



Lilium auratum (*Golden-rayed Lily*). *Hardy bulb, white, yellow and crimson flowers August, 3-8 ft.*



Lilium brownii. *Hardy bulb, white and rose-purple flowers, July, 3-4 ft.*



Lilium davidii willmottiae. Hardy bulb, orange-red, brown speckled flowers, July and August. 3-4 ft.



Lilium hollandicum. Hardy bulb, yellow-orange, apricot or red flowers, June and July. 1½-2 ft.



Lilium martagon. Hardy bulb, dull purple flowers, July, 3-6 ft.



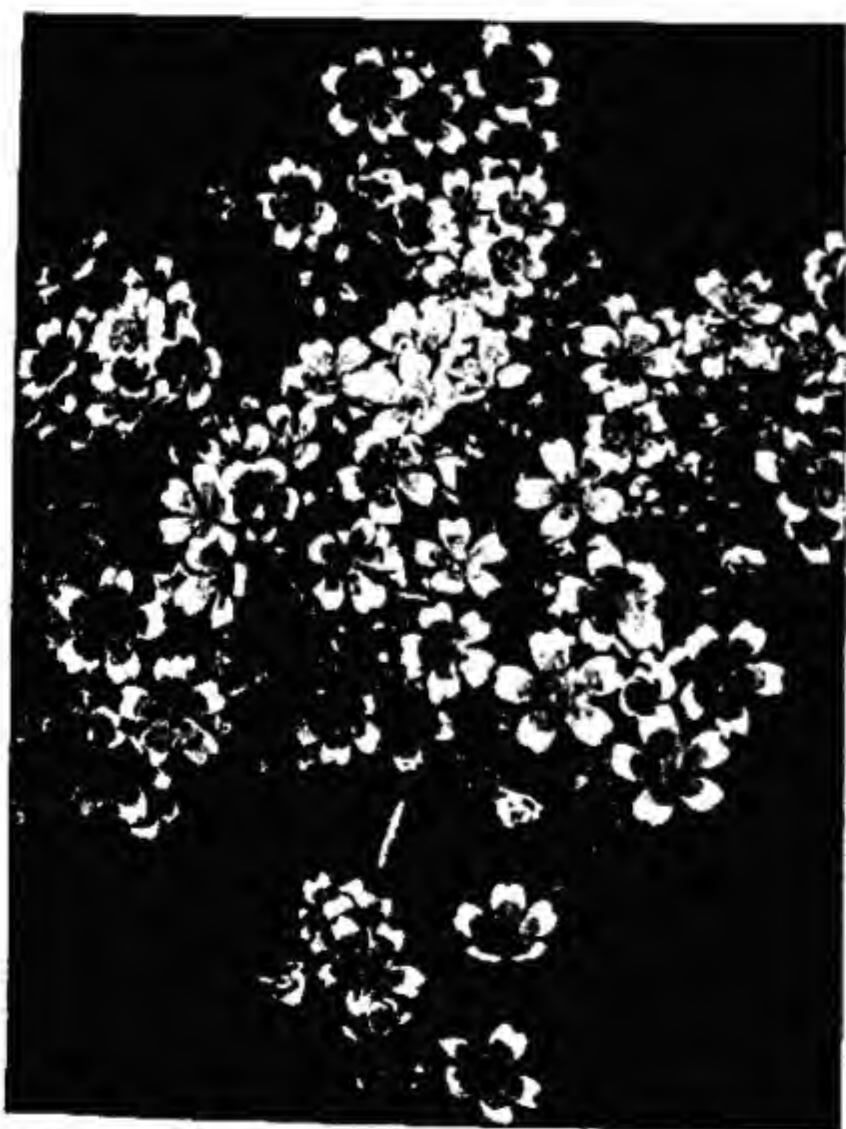
Lilium rubellum. Hardy bulb, rose-pink flowers, May and June. 1½-2½ ft.



Lilium speciosum. Hardy bulb, white and crimson flowers, August and September. 3-6 ft.



Lilium szovitsianum. Hardy bulb, yellow flowers, June. 2½-5 ft.



Limnanthes douglasii. Hardy annual, yellow and white flowers, April to September. 1 ft.



Limonium latifolium (Sea Lavender). Hardy perennial, blue flowers, summer. 2-3 ft.



Linaria dalmatica. Hardy perennial, yellow flowers, summer. 3-4 ft.



Linum perenne (Flax). Hardy perennial blue flowers, summer. 1-1½ ft.



Lippia citriodora (Lemon-scented Verbena). Half-hardy shrub, lilac flowers, August. 10-15 ft.



Liquidambar styraciflua (Sweet Gum). Hardy tree, greenish-yellow flowers, spring. 50-80 ft.



Liriodendron tulipifera (Tulip Tree). Hardy tree, greenish-white and orange flowers. 60-100 ft.



Liriope spicata variegata. Hardy perennial, white or pale lilac flowers, autumn. 1-1½ ft.



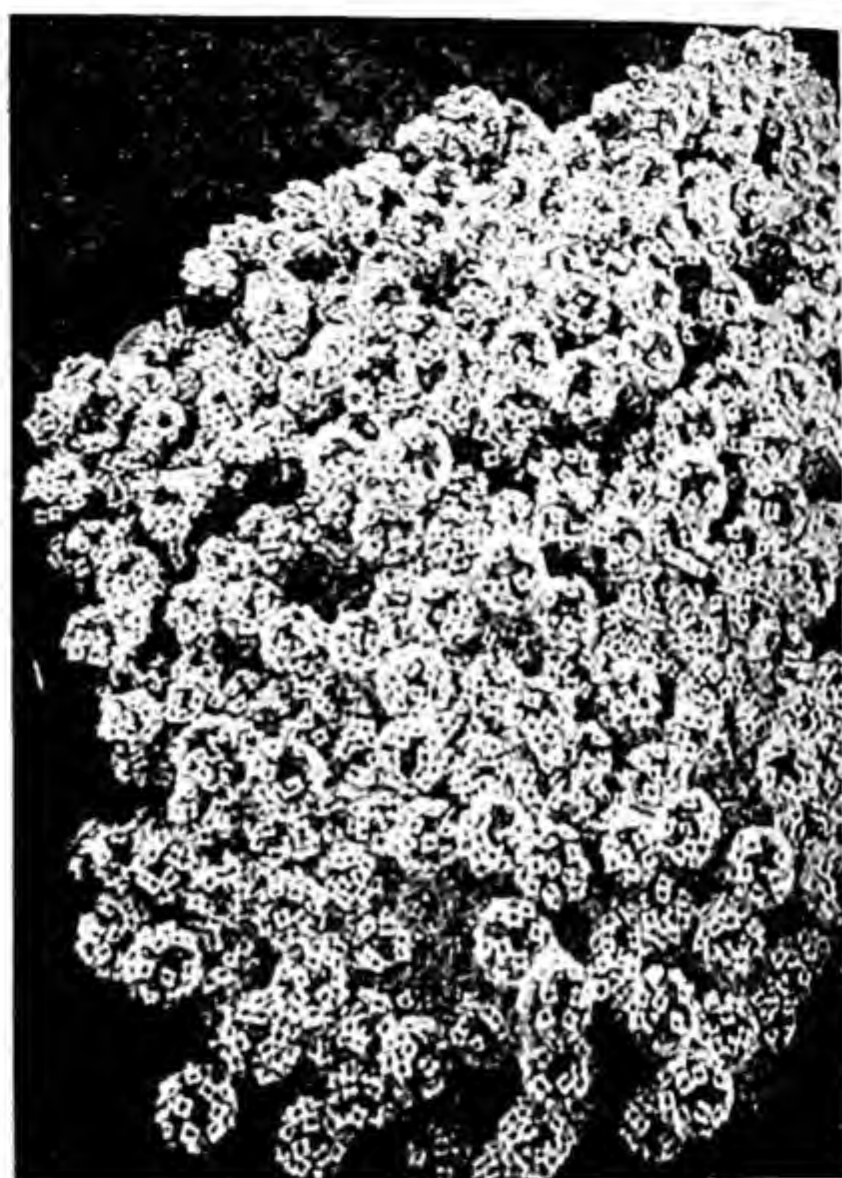
Lithospermum canescens. Hardy shrub, yellow flowers, July. 9-12 in.



Lobelia cardinalis. Hardy perennial, scarlet flowers, July. 2-3 ft.



Lobelia erinus. Half-hardy perennial, blue flowers, summer, 6 in.



Lobularia maritima (Sweet Alyssum). Hardy perennial, white flowers, spring and summer, 6-12 in.



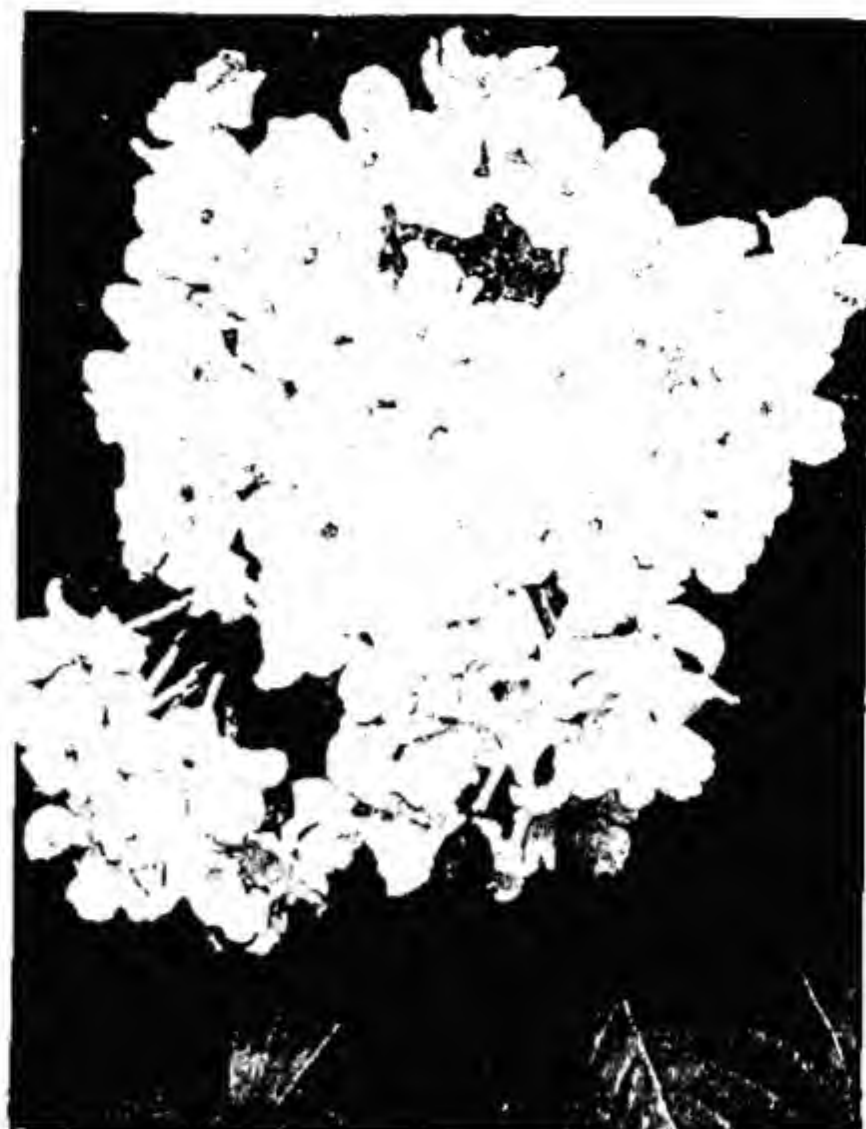
Lomatia obliqua. Greenhouse shrub, white flowers, summer, 20 ft.



Lonicera nitida. Hardy shrub, creamy-white flowers, summer, 4-6 ft.



Lonicera periclymenum (Woodbine). Hardy climber, cream and rose flowers, summer.



Luculia gratissima. Greenhouse shrub, rose flowers, autumn. 8-10 ft.



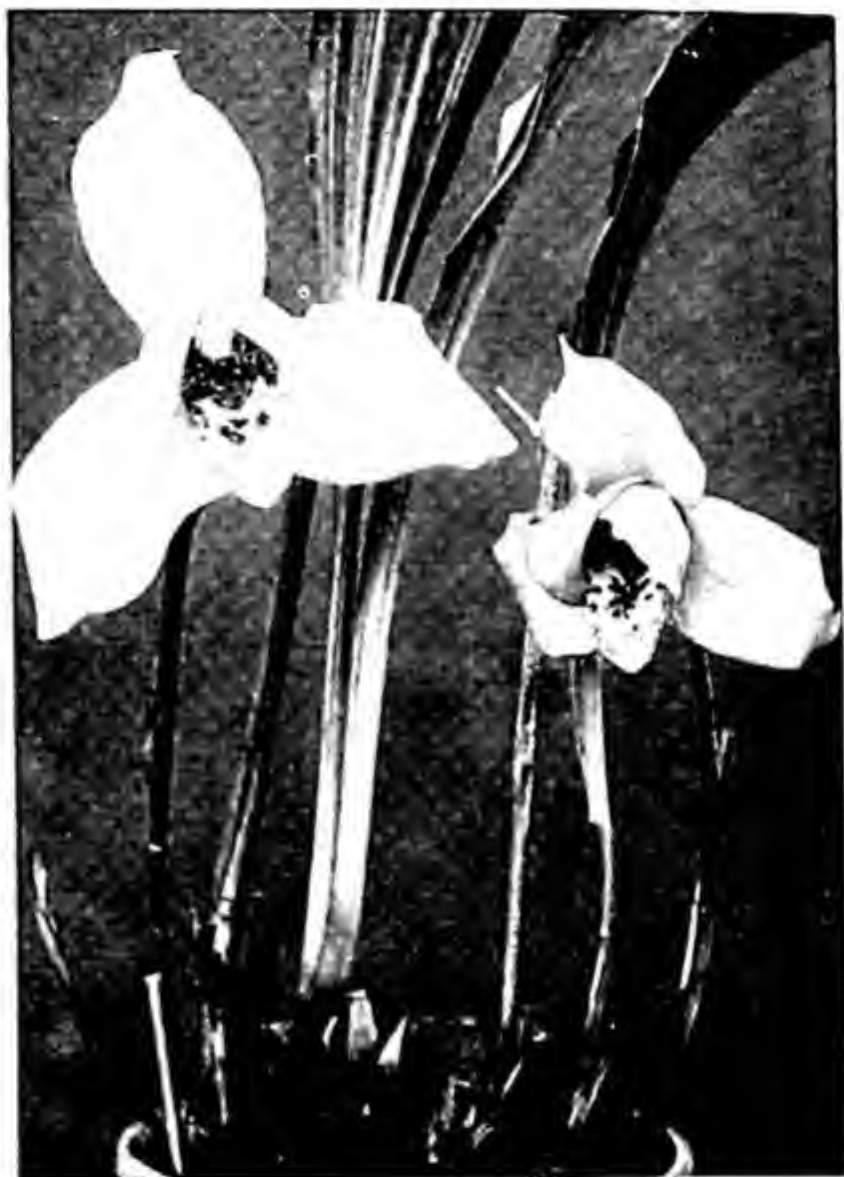
Luffa cylindrica (Loofah). Greenhouse climbing annual, yellow flowers, gourd-like fruits.



Lunaria annua (Honesty). Hardy biennial, white or purple flowers, May and June. 2-3 ft.



Lupinus polyphyllus (Lupin). Hardy perennial, variously coloured flowers, summer. 4 ft.



Lycaste skinneri. Epiphytic orchid, white rose and purple flowers, summer. 2 ft.



Lychnis coronaria. Hardy perennial, carmine flowers, summer. 2-3 ft.



Lycium chinense (Duke of Argyll's Tea-tree). Hardy shrub, purple flowers, summer. 12 ft.



Lycopodium phyllanthum. Stove perennial club-moss. 2 ft.



Lygodium japonicum (Climbing Fern). Greenhouse fern. Shoots 8-10 ft. long.



Lysimachia thyrsiflora. Hardy perennial, yellow flowers, June and July. 3 ft.



Lythrum salicaria (Purple Loosestrife). Hardy perennial, carmine flowers, July. 3-4 ft.



Macleaya cordata (*Plume Poppy*). Hardy perennial, buff or whitish flowers, July. 6-8 ft.



Magnolia denudata. Hardy tree, white flowers, spring, 30 ft.



Magnolia sinensis. Hardy tree, white and crimson flowers, summer. 20 ft.



Mahonia aquifolium. Hardy shrub, yellow flowers, spring. To 3 ft.



Maianthemum bifolium. Hardy herbaceous perennial, white flowers, May. 6 in.



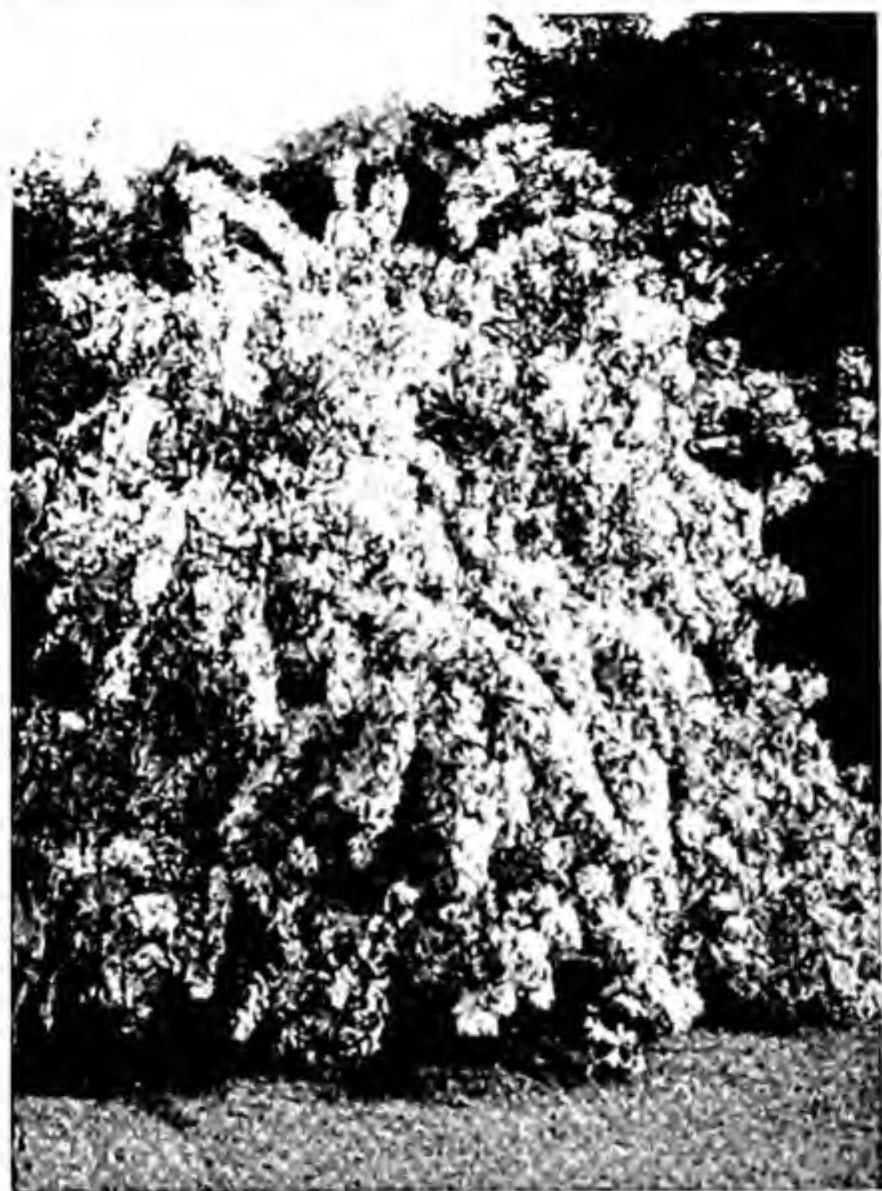
Malcolmia maritima (Virginia Stock). Hardy annual, variously coloured flowers, summer. 6 in.



Malope trifida grandiflora. Hardy annual, crimson flowers, summer. 2-3 ft.



Malus baccata (Siberian Crab Apple). Hardy tree white or pink flowers, spring, scarlet or yellow fruits 40 ft.



Malus floribunda. Hardy tree, rose-red flowers changing to white. 15-25 ft.



Malva moschata (Musk Mallow). Hardy perennial, pink flowers, summer. 3 ft.



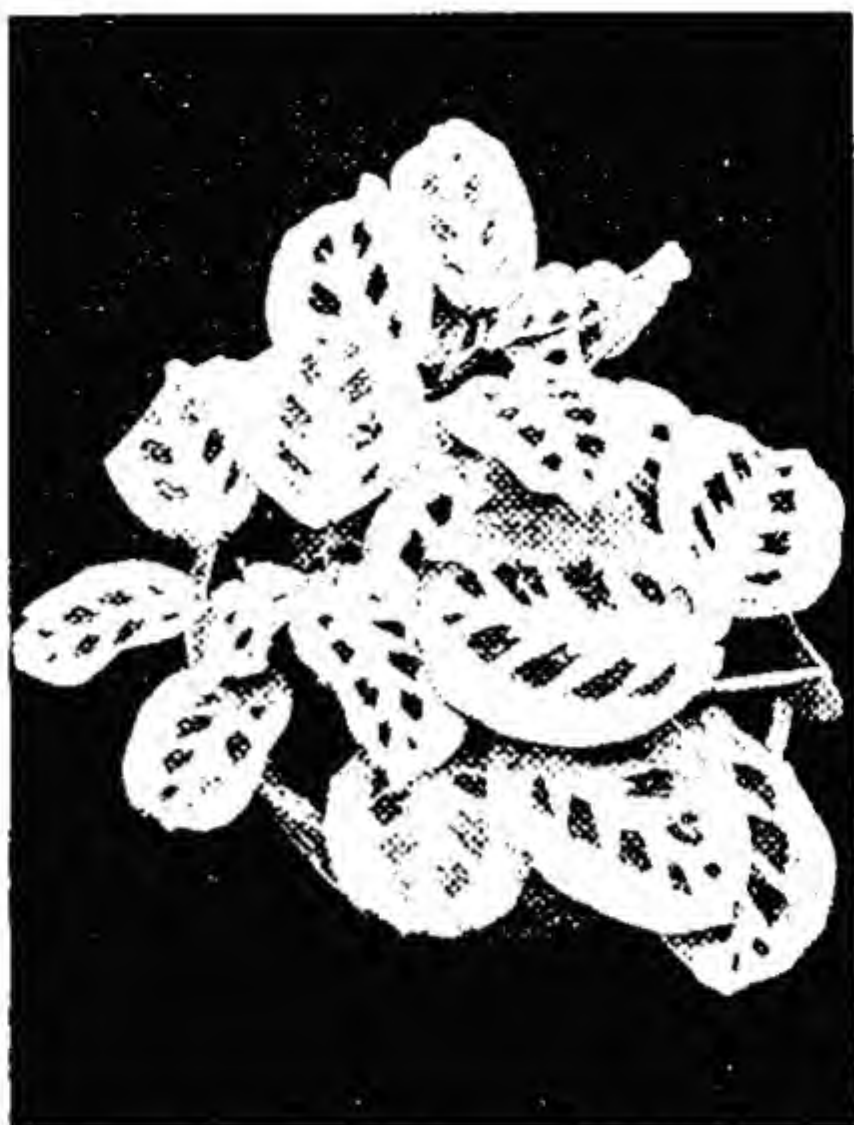
Mammillaria elongata. Greenhouse succulent, yellow flowers, summer. 3 in.



Mandragora autumnalis (Mandrake). Hardy perennial, violet flowers, September. 6-12 in.



Manettia inflata. Greenhouse climber, scarlet and orange flowers, March to December. 10-15 ft.



Maranta leuconeura. Greenhouse perennial or house plant, light green, white and purple leaves. 1 ft.



Marrubium vulgare (Horehound). Hardy perennial, white flowers, June to September, 1 ft.



Martynia louisiana. Half-hardy annual, yellowish flowers, green, saffron and violet markings, summer. 2 ft.



Masdevallia coccinea. Epiphytic orchid, magenta to deep crimson and purple flowers, spring.



Matthiola incana annua (Brompton Stock). Hardy annual, variously coloured flowers, autumn. 1-3 ft.



Matricaria inodora plenissima (Double Mayweed). Hardy perennial, white flowers, summer. 1 ft.



Maurandya barclaiana. Half-hardy climbing perennial, violet flowers, summer.



Mazus japonicus. Hardy rock plant, lilac-blue flowers, summer. 1-3 in.



Meconopsis betonicifolia Baileyi (Blue Poppy). Hardy perennial, blue flowers, summer. 3-4 ft.



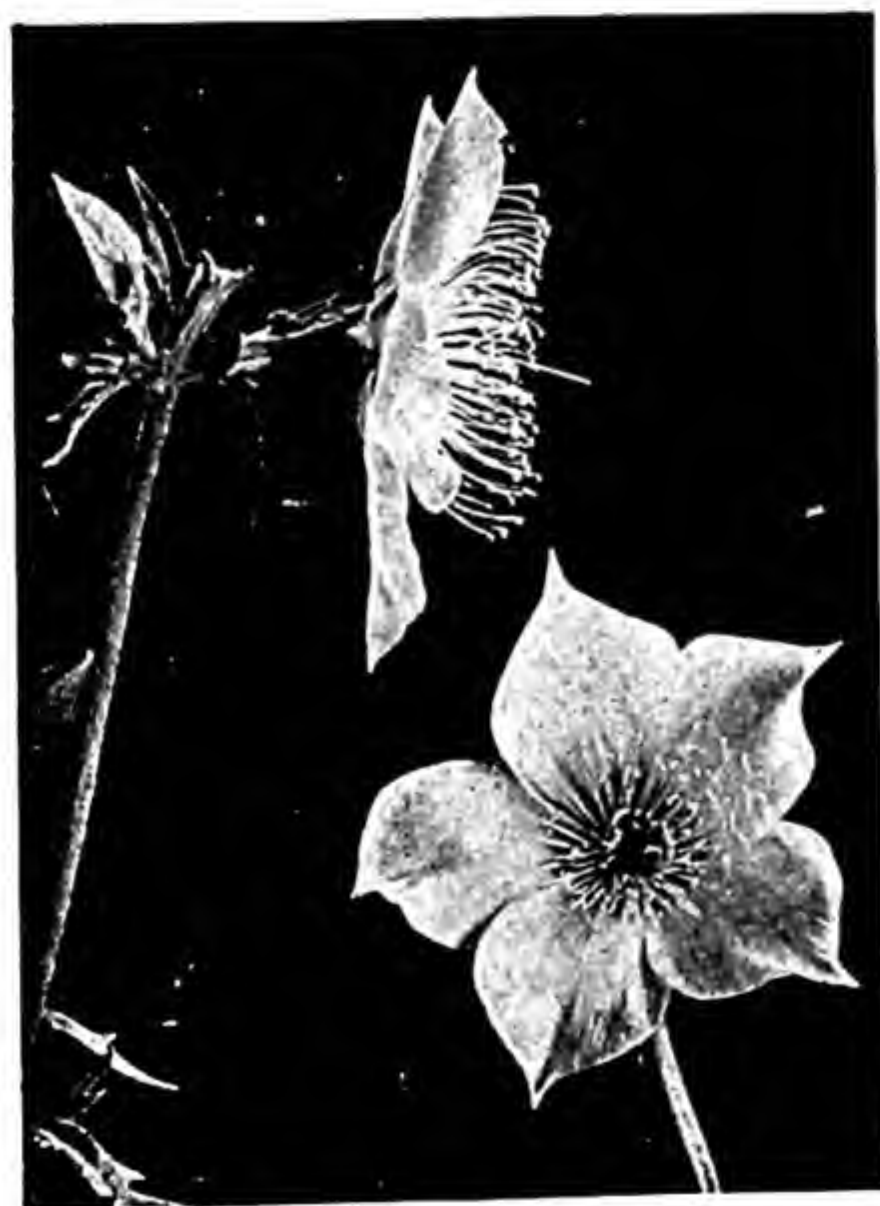
Melianthus major (Cape Honey Flower). Half-hardy shrub, brown flowers, summer. 4-6 ft.



Melissa officinalis (Balm). Hardy perennial, white or yellow flowers, summer. 3 ft.



Melittis melissophyllum. Hardy perennial, creamy-white and pink flowers, May. $1\frac{1}{2}$ ft.



Mentzelia lindleyi. Hardy annual, golden-yellow flowers, summer. $1\frac{1}{2}$ ft.



Menyanthes trifoliata (Bog Bean). Hardy perennial aquatic, pink flowers, March to June. 1 ft.



Menziesia cilicalyx multiflora. Hardy shrub, yellowish flowers, spring. $1\frac{1}{2}$ - $2\frac{1}{2}$ ft.



Mertensia sibirica. Hardy perennial, blue flowers, May, 6-18 in.



Mesembryanthemum putterillii. Greenhouse succulent, orange-red flowers, summer. 1 ft.



Mespilus germanica (Medlar). Hardy tree, white flowers, May and June, edible fruits, 20 ft.



Metrosideros tomentosa. Greenhouse evergreen tree, dark red flowers, July. Up to 70 ft. (in nature).



Michauxia campanuloides. Hardy perennial, white flowers, July. 4-6 ft.



Michelia doltsopa. Hardy evergreen tree, white flowers, spring. 20-40 ft.



Miltonia vexillaria. Stove orchid, variable rose-coloured flowers often purple blotched, summer.



Mimosa pudica (*Sensitive Plant*). Stove perennial, pink flowers, summer. 1-1½ ft.



Mimulus triginus (*Monkey Flower*). Hardy perennial, red-spotted flowers, summer. 1-1½ ft.



Mirabilis jalapa (*Marvel of Peru*). Half-hardy perennial, variously coloured flowers, summer. 2-3 ft.



Miscanthus sinensis zebrinus. Hardy grass, yellow-banded leaves. 6-9 ft.



Monarda didyma (*Bee Balm*). Hardy perennial, scarlet, pink or purple flowers, summer. 3-4 ft.



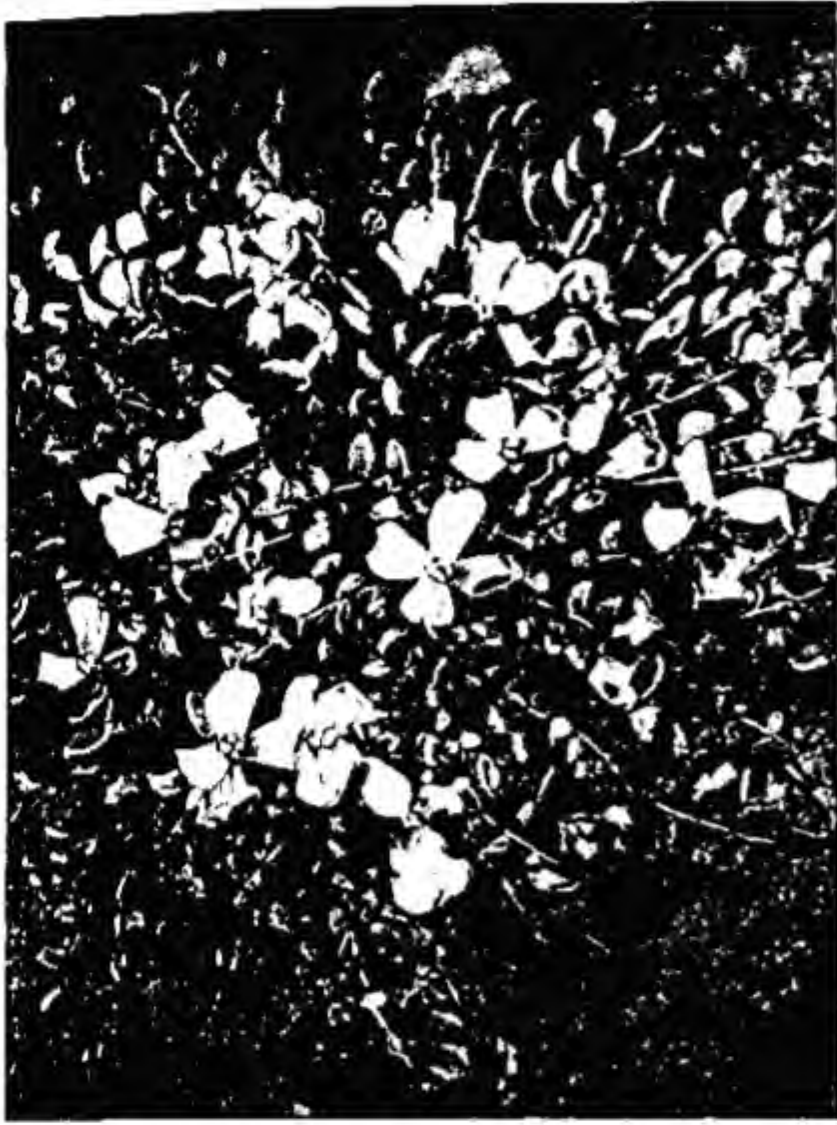
Monstera deliciosa. Stove evergreen ornamental climber, yellow flowers, summer.



Moraea pavonia (*Peacock Iris*). Half-hardy corm, red and blue-black flowers, summer. 1-2 ft.



Morina coulteriana (*Whorl Flower*). Hardy perennial, yellow flowers, June. 1½ ft.



Morisia monanthos. Hardy rock plant, golden-yellow flowers, spring, prostrate.



Morus nigra (Mulberry). Hardy tree, greenish-white flowers, black fruit. 30 ft.



Musa paradisiaca sapientum (Banana). Greenhouse perennial, edible fruits. 30 ft.



Muscari botryoides (Grape Hyacinth). Hardy bulb, blue flowers, spring. 6 in.



Mutisia decurrens. Hardy climber, orange flowers, summer, 6-10 ft.



Myosotidium hortensia. Hardy perennial, blue and white flowers, spring. 1-1½ ft.



Myosotis alpestris. Hardy perennial, blue and white, flowers, June. 6-8 in.



Myrrhis odorata (Sweet Cicely). Hardy perennial, white flowers, May. 3 ft.



Myriophyllum brasilense (*Parrot's Feather*). Hardy aquatic trailing plant, feathery leaves.



Myrtus communis (*Common Myrtle*). Tender evergreen shrub, white flowers, summer. 10 ft.



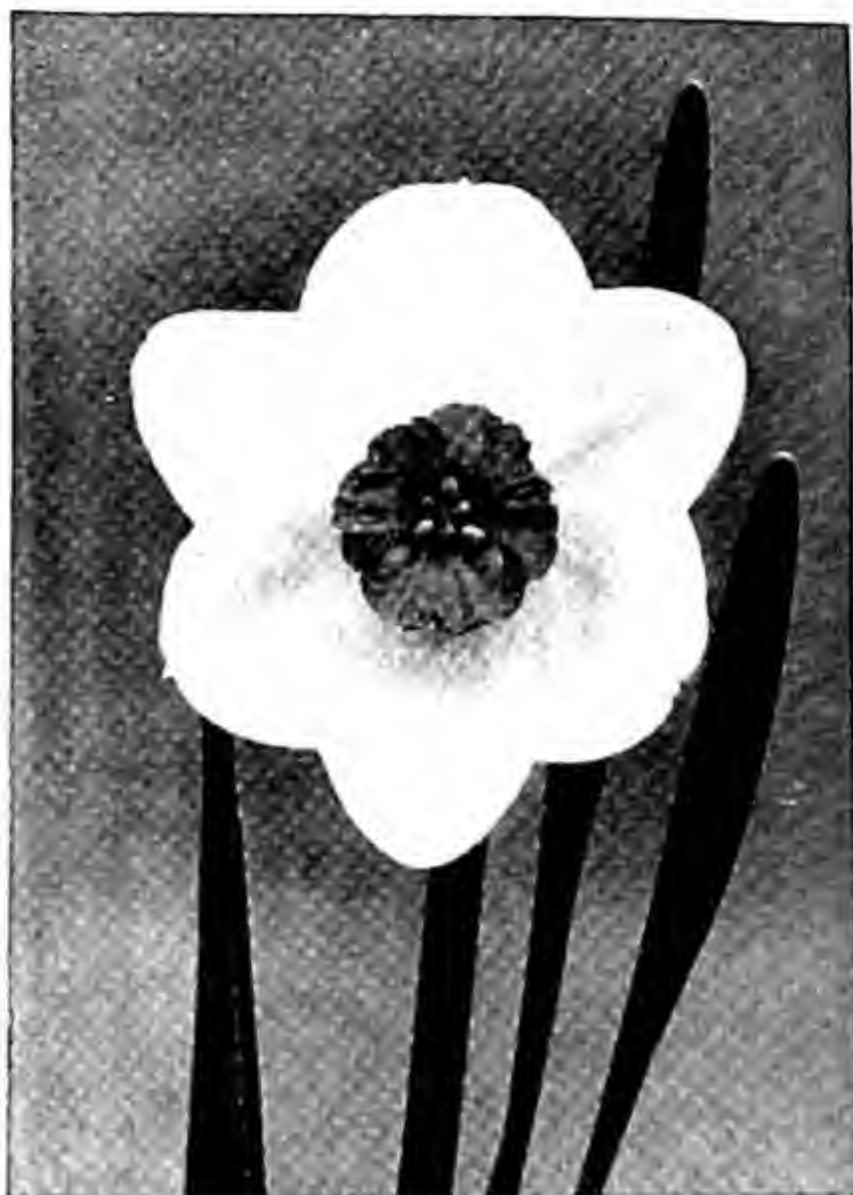
Nandina domestica. Half-hardy shrub, white flowers, summer. 6-8 ft.



Narcissus 'Broughshane'. (Div. Ic) (*Trumpet Daffodil*) Hardy bulb, white flowers, spring. 15-18 in.



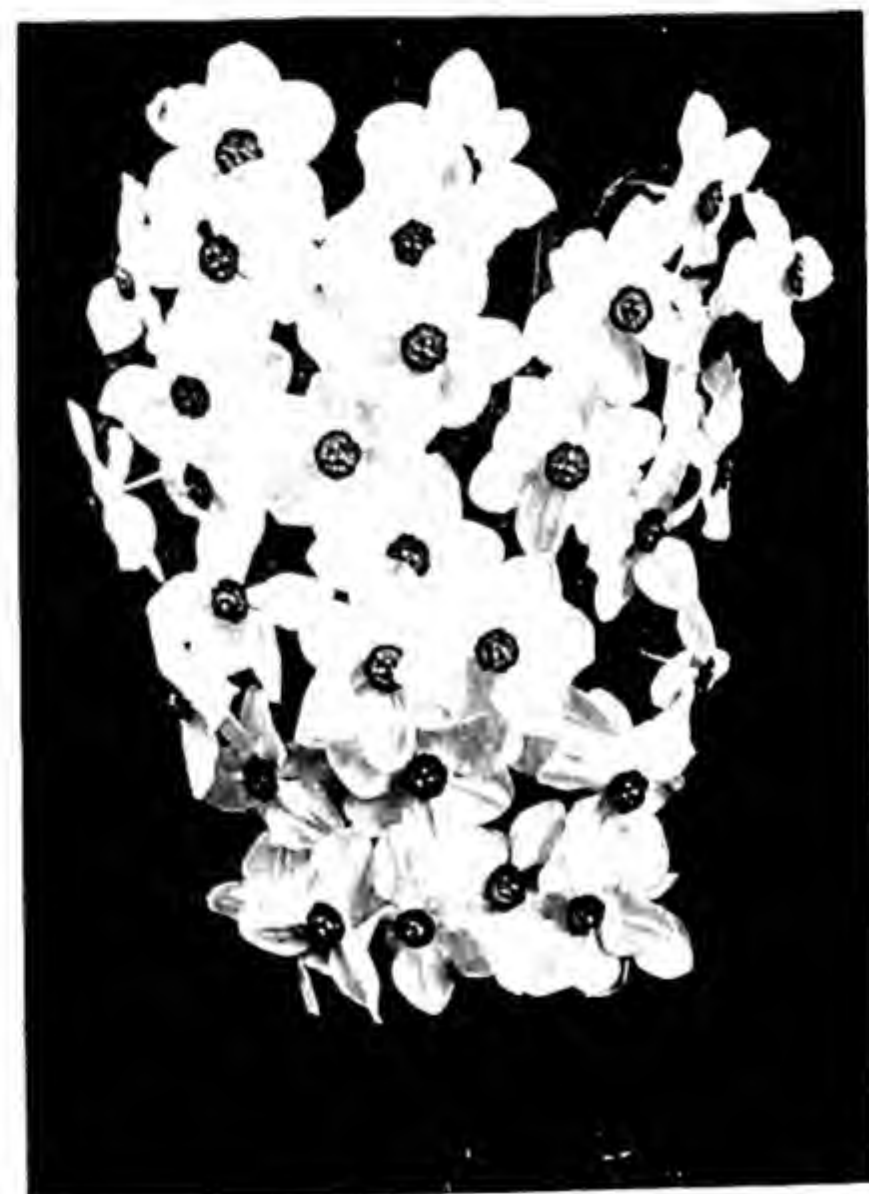
Narcissus 'Krakatoa'. (Div. IIc) Hardy bulb, yellow flowers, spring, 15-18 in.



Narcissus 'Mahmoud'. (Div. IIIa) Hardy bulb, white perianth and red cup, spring, 15-18 in.



Narcissus 'Santa Claus'. (Div. IV) Hardy bulb, white flowers, spring, 15-18 in.



Narcissus poeticus. (Div. IX) (Poet's Narcissus). Hardy bulb, white perianth and red eye. 15-18 in.



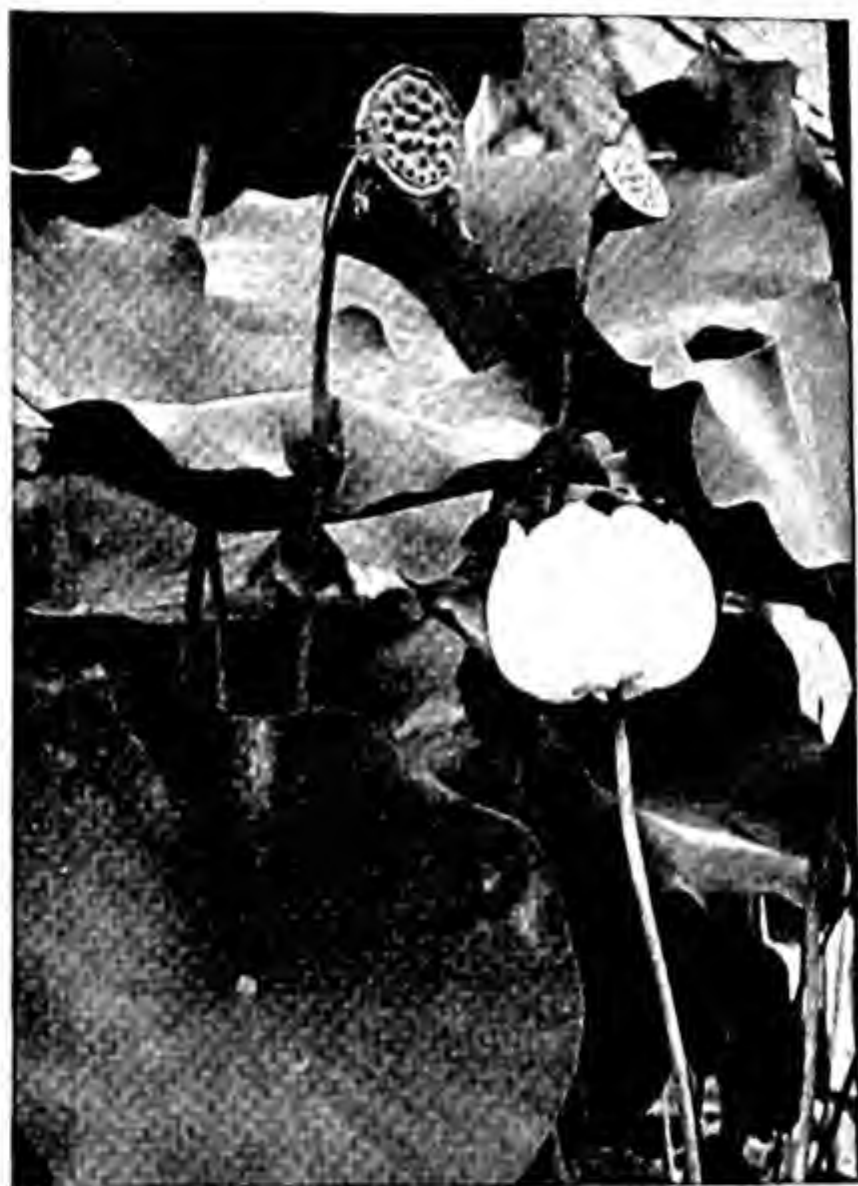
Narcissus bulbocodium (Div. X) (*Hoop Petticoat Daffodil*). Hardy bulb, yellow flowers, April. 6 in.



Narcissus cyclamineus. (Div. X) Hardy bulb, lemon and yellow flowers, spring. 4-9 in.



Neilia longiracemosa. Hardy shrub, rose-pink flowers, July. 6-8 ft.



Nelumbo nucifera alba (Lotus). Greenhouse aquatic perennial, pink flowers, summer.



Nemesia strumosa. Half-hardy annual, variously coloured flowers, summer. 1 ft.



Nemophila menziesii. Hardy annual, white or blue flowers, summer. 4 in.



Nepenthes sanguinea (Pitcher Plant). Stove perennial, blood-red pitchers.



Nepeta faassenii (Catmint). Hardy perennial, lavender-blue flowers, summer, 18 in.



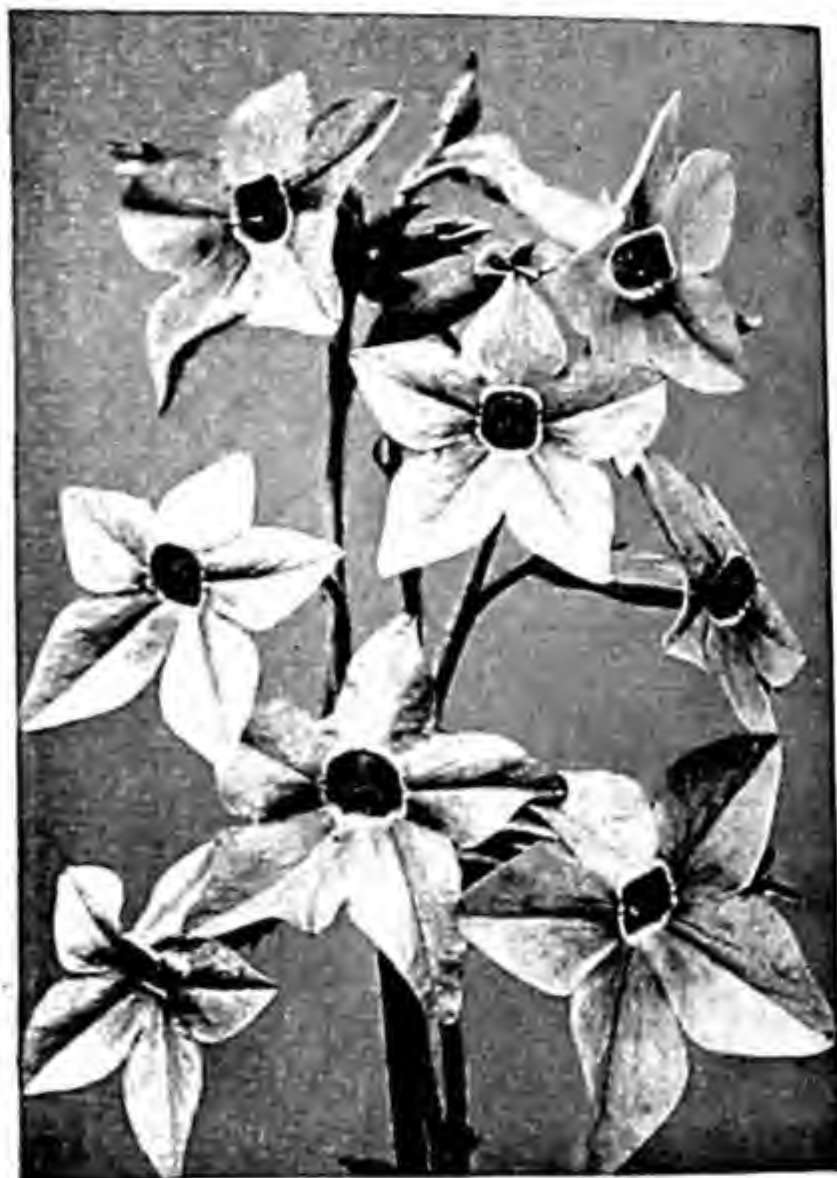
Nephrolepis exaltata var. (Ladder Fern). Greenhouse fern, 2-3 ft.



Nerine flexuosa. Greenhouse bulb, pink flowers, summer, 2 ft.



Nerium oleander (Oleander). Greenhouse shrub, white or rose flowers, summer. 20 ft.



Nicotiana glauca (Jasmine Tobacco). Half-hardy annual, variously coloured flowers, summer. 2-3 ft.



Nidularium fulgens. Stove ornamental plant, white and violet flowers, crimson bracts. 9-12 in.



Nierembergia repens. Hardy rock plant, white flowers, summer. 3-6 in.



Nigella damascena (Love-in-a-Mist). Hardy annual, blue flowers, summer. 1-2 ft.



Nomocharis saluenensis. Hardy bulb, white, yellow or rose flowers, summer. 2-3 ft.



Notholirion thomsonianum. Hardy bulb, pale mauve flowers, May. 2-3 ft.



Notospartium carmichaeliae. Half-hardy shrub, pink flowers, August. 4-10 ft.



Nuphar lutea (Brandy Bottle). Hardy aquatic perennial, yellow flowers, summer.



Nymphaea alba (Water Lily). Hardy aquatic perennial, white flowers, summer.



Nymphoides indica (Water Snowflake). Tender aquatic, white flowers, summer.



Odontioda cooksoniae Fowler's variety. *Epiphytic orchid, maroon and white flowers, summer.*



Odontoglossum crispum. *Epiphytic orchid, white, rose-tinged flowers, spring and summer.*



Odontoglossum grande. *Epiphytic orchid, yellow and chestnut-brown flowers, autumn.*



Oenothera missouriensis. *Hardy perennial, yellow flowers, summer, trailing.*



Olea europaea (Olive). Half-hardy shrub or tree, white flowers, summer. 20-40 ft.



Olearia stellulata. Half-hardy shrub, white flowers, May and June. 6 ft.



Omphalodes luciliae (Rock Forget-me-not). Hardy rock plant, pale blue flowers, summer. 6 in.



Omphalogramma vinciflorum. Hardy perennial, violet-purple flowers, summer. 9-12 in.



Oncidium papilio (Butterfly Orchid). Stove epiphytic orchid, red and yellow flowers.



Oncidium pulvinatum. Epiphytic orchid, red-brown and yellow flowers, summer.



Onoclea sensibilis (Sensitive Fern). Hardy deciduous fern. 2-3 ft.



Ononis natrix (Goat Root). Hardy perennial, yellow and red flowers, summer. 1-2 ft.



Onopordum acanthium (Cotton Thistle). Hardy perennial, pale purple flowers, summer. 5 ft.



Onosma tauricum (Golden Drop). Hardy perennial, pale yellow flowers, May. 1 ft.



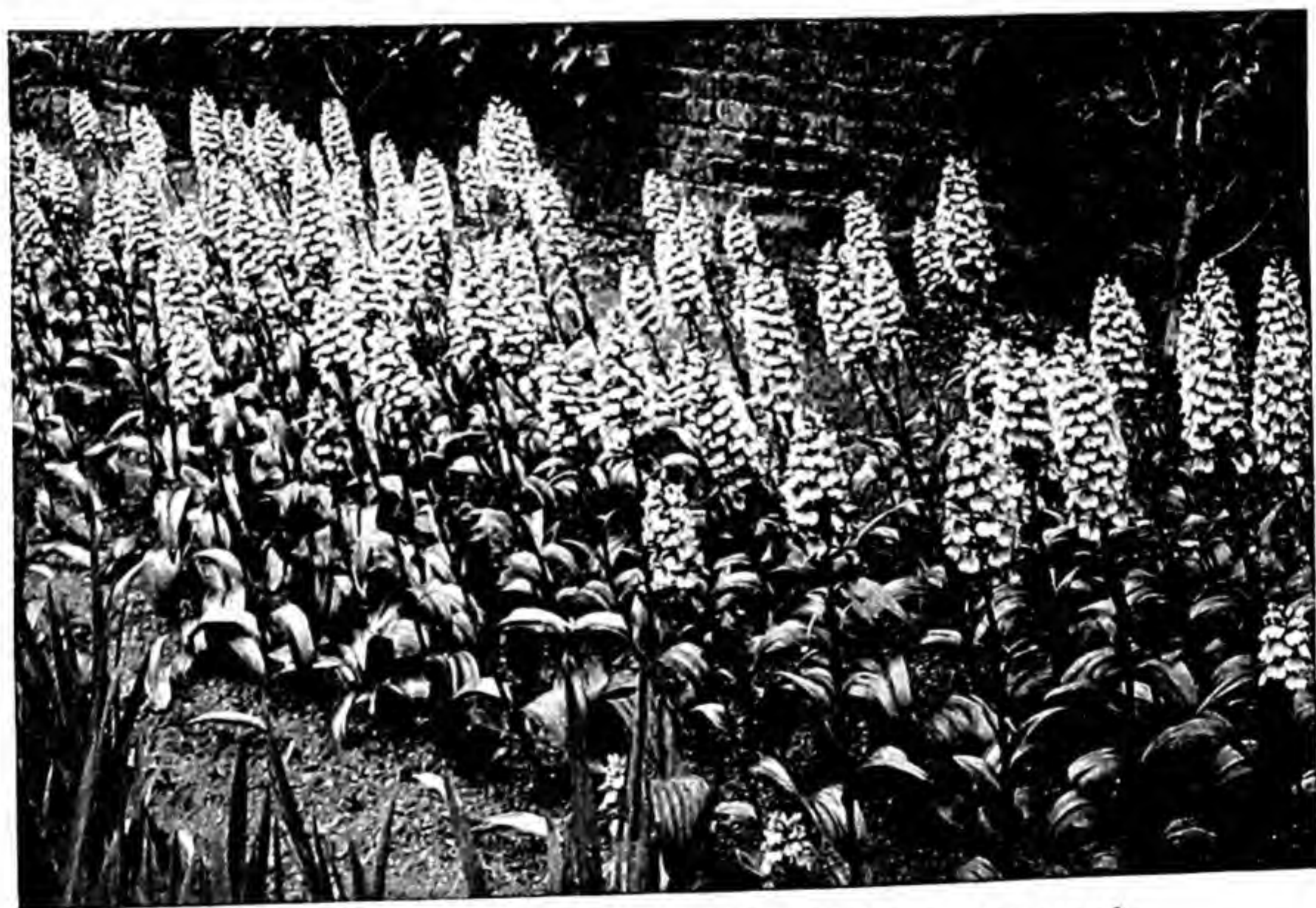
Ophrys apifera (Bee Orchid). Hardy orchid, pink, brown and greenish flowers, early summer. 1 ft.



Oplismenus imbecilis variegatus. Greenhouse perennial trailing grass, variegated leaves.



Opuntia leucotricha (Prickly Pear). Greenhouse cactus, yellow flowers, June.



Orchis maderensis. Hardy perennial orchid, purple flowers, summer. 1-2 ft.



Ornithogalum umbellatum (*Star of Bethlehem*). Hardy bulb, white flowers, May. 1 ft.



Orontium aquaticum (*Golden Club*). Hardy aquatic perennial, yellow and white flowers, May. 18 in.



Orphanidesia gaultherioides. Hardy evergreen shrub, pale pink flowers, spring. 1 ft.



Osmanthus ilicifolius. Hardy shrub, white flowers, autumn. 10-20 ft.



Osmarea burkwoodii. Hardy evergreen shrub, white flowers, April. 6-10 ft.



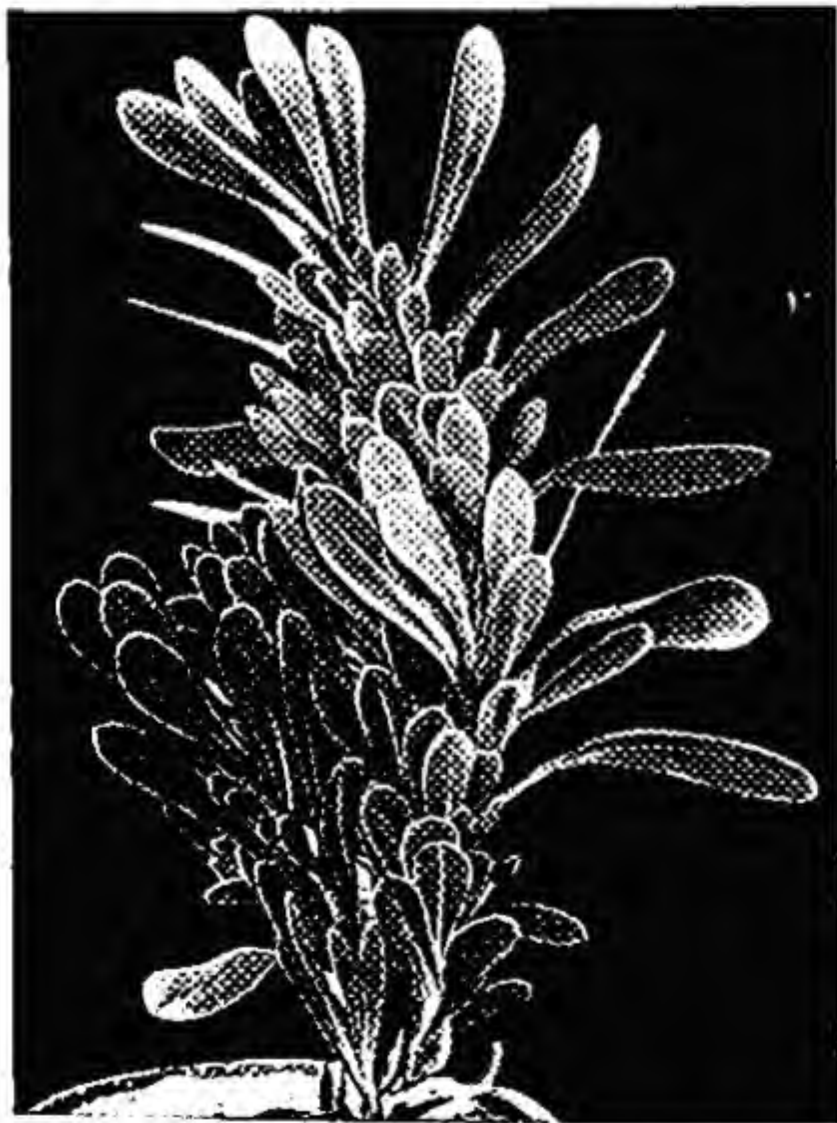
Osmunda regalis (Royal Fern). Hardy deciduous fern. 3-6 ft.



Osteomeles schwerinae. Half-hardy shrub, white flowers, June. 8-10 ft.



Ostrowskia magnifica (Giant Bellflower). Hardy perennial, lilac or white flowers, summer. 4-5 ft.



Othonnopsis cheirifolia. Half-hardy perennial, yellow flowers, spring and summer. 1 ft.



Ourisia elegans. Hardy rock plant, scarlet flowers early summer. 9 in.



Oxalis enneaphylla. Hardy rock plant, pale pink flowers, May and June. 2-3 in.



Oxycodendrum arboreum (Sorrel Tree). Hardy tree, white flowers, June or July. 10-30 ft.



Pachysandra procumbens. Hardy shrub, greenish-white flowers, March. 6 in.



Pachystachys coccinea. Stove shrub, scarlet flowers, summer. 7 ft.



Paeonia lactiflora flore plena (Peony). Hardy perennial, variously coloured flowers, June. 3 ft.



Paeonia suffruticosa 'Constantia'. Hardy shrub, rose-scarlet flowers, May. 3-6 ft.



Pancratium canariense. Stove bulb, white flowers, October and November. $1\frac{1}{2}$ ft.



Papaver orientale 'Perry's White' (Oriental Poppy). Hardy perennial, white flowers, summer. 3 ft.



Papaver rhoeas (Shirley Poppy). Hardy annual, variously coloured flowers, summer. 18 in.



Paphiopedilum insigne. Terrestrial orchid, white green and brown flowers, winter.



Paradisea liliastrum (St. Bruno Lily). Hardy perennial, white flowers, May and June, 1-2 ft.



Parochetus communis (Shamrock Pea). Nearly-hardy perennial trailer, blue flowers, March to June.



Parrotia persica. Hardy tree, coloured foliage, autumn. 15 ft.



Passiflora caerulea (Passion Flower). Half-hardy climber, blue and white flowers, summer.



Paulownia tomentosa. Hardy tree, violet flowers, June. 30-50 ft.



Pavonia rosea. Stove flowering plant, rosy-red flowers, summer. 1-2 ft.



Pelargonium zonale (*Geranium*). Half-hardy perennial, white, pink or scarlet flowers, summer. 2 ft.



Penstemon barbatus. Hardy perennial, scarlet flowers, summer. 3 ft.



Peperomia sandersii argyreia. Stove perennial or house plant, green and silver striped leaves.



Perilla frutescens nankinensis. Half-hardy annual foliage plant, purple bronze leaves. 1-3 ft.



Pernettya mucronata. Hardy evergreen shrub, white flowers, spring, variously coloured berries. 2-5 ft.



Perovskia atriplicifolia. Hardy shrub, lavender blue flowers, August and September. 3-5 ft.



Petasites japonicus. Hardy perennial, white or purple flowers, February. 6 ft.



Petrophytum hendersonii. Prostrate evergreen rock garden shrub, white flowers, summer. 1 in.



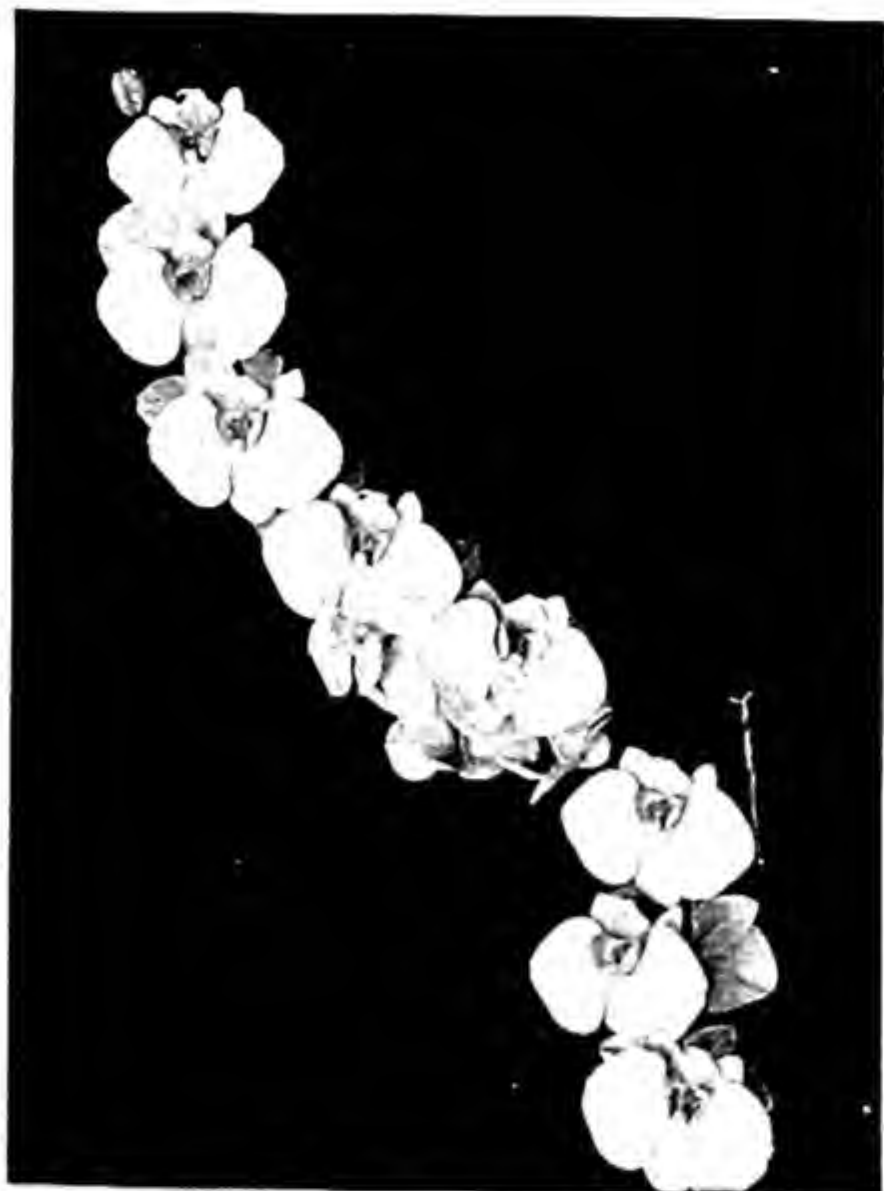
Petunia hybrida. Half-hardy perennial, variously coloured flowers, summer. 6 in.-2 ft.



Phacelia campanularia. Hardy annual, blue flowers, summer. 8 in.



Phaius tuberculosus. Terrestrial orchid, white and yellow flowers, winter.



Phalaenopsis schilleriana (Moth Orchid). Stove epiphytic orchid, pink and red flowers, winter.



Phalaris arundinacea variegata. Hardy perennial grass, variegated leaves. 3-6 ft.



Philadelphus coronarius (Mock Orange). Hardy shrub, cream flowers, June. 10 ft.



Phillyrea decora. Hardy shrub, white flowers, purplish-black fruits, May. 8-10 ft.



Philodendron scandens. Stove evergreen climber or house plant, arum-like flowers.



Phlomis fruticosa (Jerusalem Sage). Hardy evergreen shrub, yellow flowers, June. 3-4 ft.



Phlox subulata. Hardy rock plant, variously coloured flowers, early summer. 4-6 in.



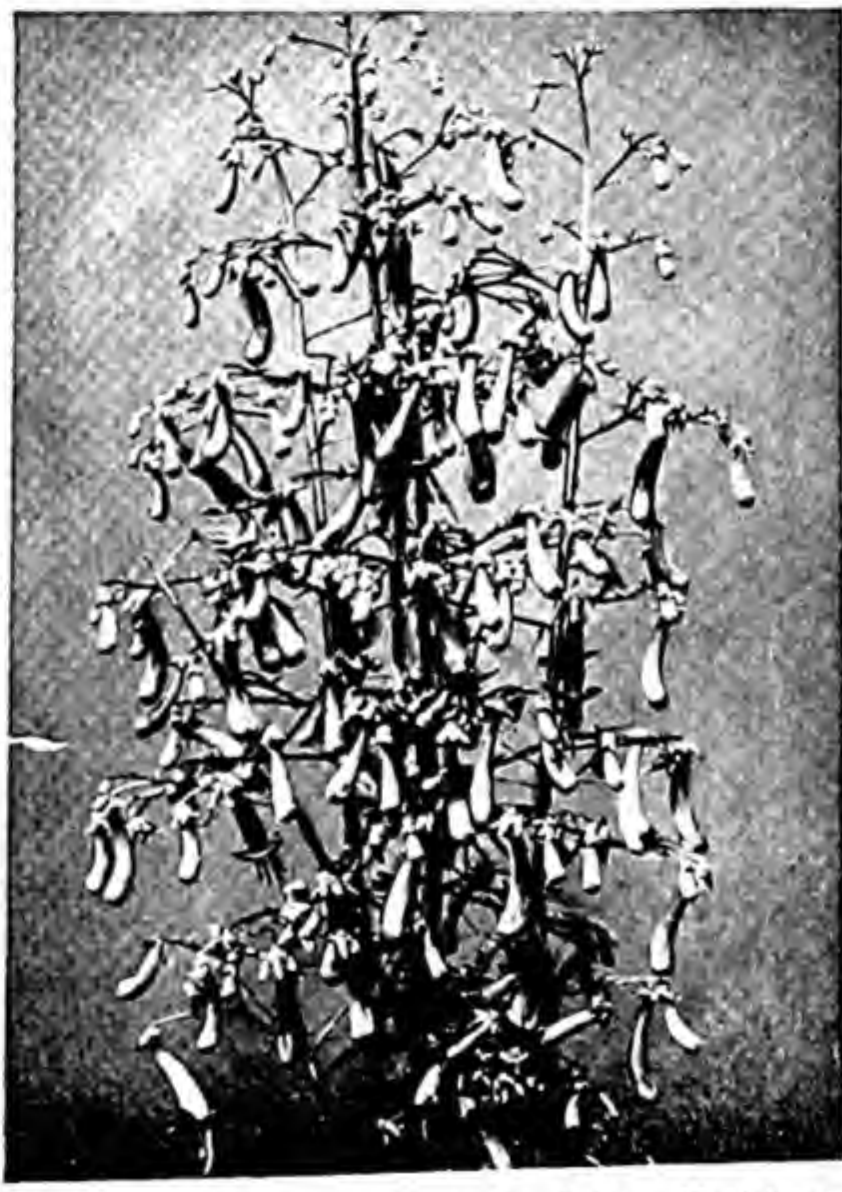
Phlox paniculata. Hardy perennial, pink, purple, scarlet or white flowers, August. 3-4 ft.



Phoenix roebelenii. Stove feather palm with shining dark green leaflets. 4-6 ft.



Phormium tenax. (New Zealand Flax) Half-hardy perennial, bronze-red flowers, summer. 5-12 ft.



Phygelius capensis (Cape Fuchsia). Half-hardy shrub, scarlet flowers, September. 2-6 ft.



Phyllanthus pulcher. Stove or house plant, ornamental foliage, yellow flowers, summer. 3-4 ft.



Phyllitis scolopendrium (Hart's Tongue Fern) (Garden Form). Hardy evergreen fern. 6-18 in.



Phyllodoce caerulea. Hardy shrub, bluish-purple flowers, June and July. 6-9 in.



Phyllostachys viridi-glaucescens. Half-hardy bamboo, yellowish stems. To 25 ft.



Physostegia virginiana. Hardy perennial, pink flowers, July to September. 1-4 ft.



Phyteuma comosum. Hardy rock plant, amethyst-blue flowers, summer. 6-12 in.



Phytolacca americana. Hardy perennial, white flowers, summer, purple berries. 5 ft.



Picea pungens (Colorado Spruce). Hardy evergreen conifer. 50-100 ft.



Pieris forrestii. Hardy evergreen shrub, white flowers. April. 6 ft.



Pilea microphylla (Artillery Plant). Shrubby store perennial. 3-15 in.



Pimelea spectabilis. Greenhouse evergreen shrub, white and pink flowers, May. 4 ft.



Pimenta acris. Stove flowering tree, white and pink flowers, May. 20-30 ft.



Pinguicula bakeriana. Greenhouse insectivorous plant, carmine flowers, autumn. 6 in.



Pinus sylvestris (Scots Pine). Hardy evergreen conifer. To 100 ft.



Piptanthus laburnifolius (*Nepal Laburnum*). Hardy evergreen shrub, yellow flowers, May. 8-12 ft.



Pittosporum tobira. Half-hardy shrub, white flowers, summer. 10-20 ft.



Pityrogramma chrysophylla (*Gold Fern*). Stove fern, gold-powdered fronds. 1 ft.



Platanus acerifolia (*London Plane*). Hardy tree, ball-like clusters of fruit, peeling bark. 100 ft.



Platycerium bifurcatum (*Stag's Horn Fern*). Greenhouse fern. Fronds 2-3 ft.



Platycodon grandiflorus (*Balloon Flower*). Hardy perennial, blue flowers, July to September. 1 ft.



Platystemon californicus (*Cream Cups*). Hardy annual, yellow flowers, July. 1 ft.



Pleione pricei. Terrestrial orchid, mauve and white flowers, summer. 6-8 in.



Pleiospilos bolusii (Living Stones). Greenhouse succulent, yellow flowers, September and October.



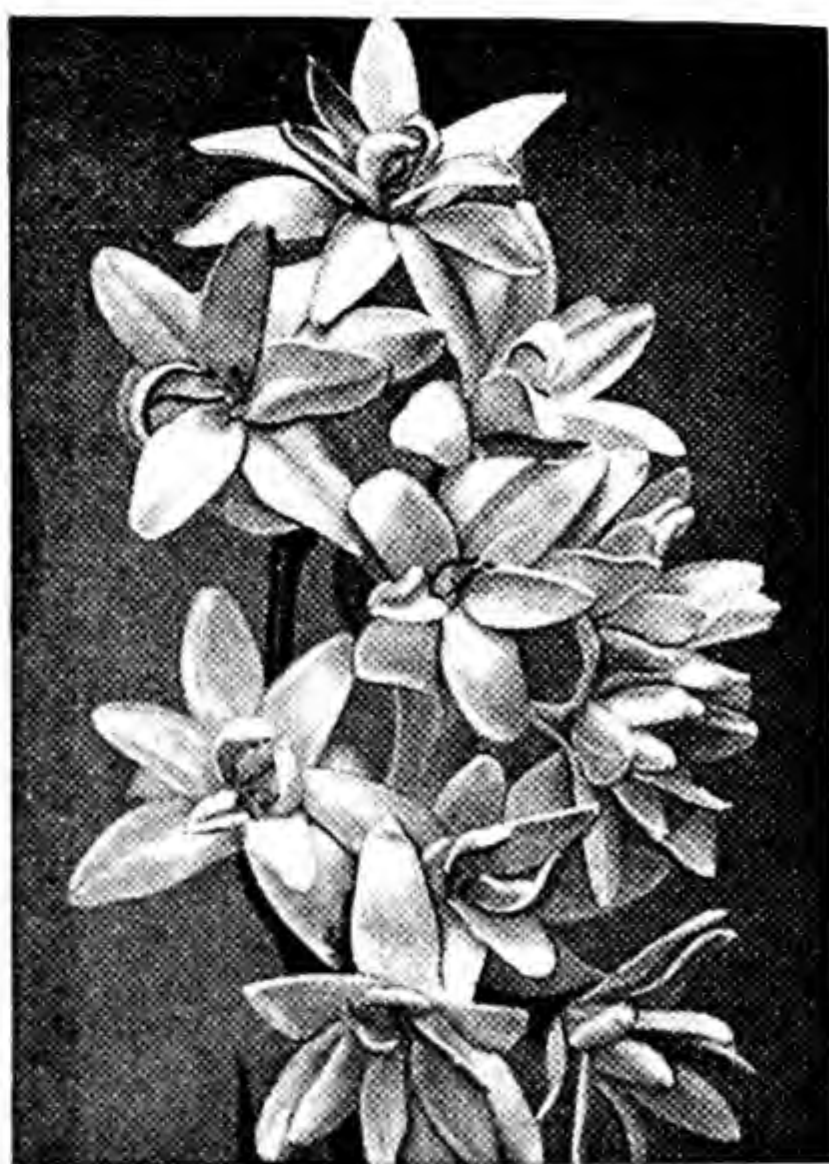
Plumbago capensis (Cape Leadwort). Greenhouse climber, blue flowers, summer. 10-15 ft.



Podophyllum hexandrum (syn. *P. emodi*). Hardy perennial, white flowers, coral-red fruits, 1 ft.



Polemonium confertum. *Hardy rock plant, blue flowers, summer, 6-8 in.*



Polianthes tuberosa (*Tuberose*). *Half-hardy tuber, white flowers, autumn and winter, 3 ft.*



Polygala chamaebuxus. *Hardy rock plant, yellow flowers, summer, 6-9 in.*



Polygonum affine. Hardy rock plant, pink floccers, August to October, 6-9 in.



Polygonum sachalinense (Sakhalin Knotweed). Hardy perennial, white flowers, summer, 10 ft.



Polypodium aureum syn. *Phlebodium aureum* (Polypody). Greenhouse fern, 3 ft.



Polystichum aculeatum (*Hard Shield Fern*). Hardy fern. Fronds up to 3 ft. high.



Poncirus trifoliata (*Hardy Orange*). Hardy tree, white flowers, spring. 15 ft.



Pontederia cordata (*Pickerel Weed*). Hardy aquatic, blue, white and green flowers, summer. 2 ft.



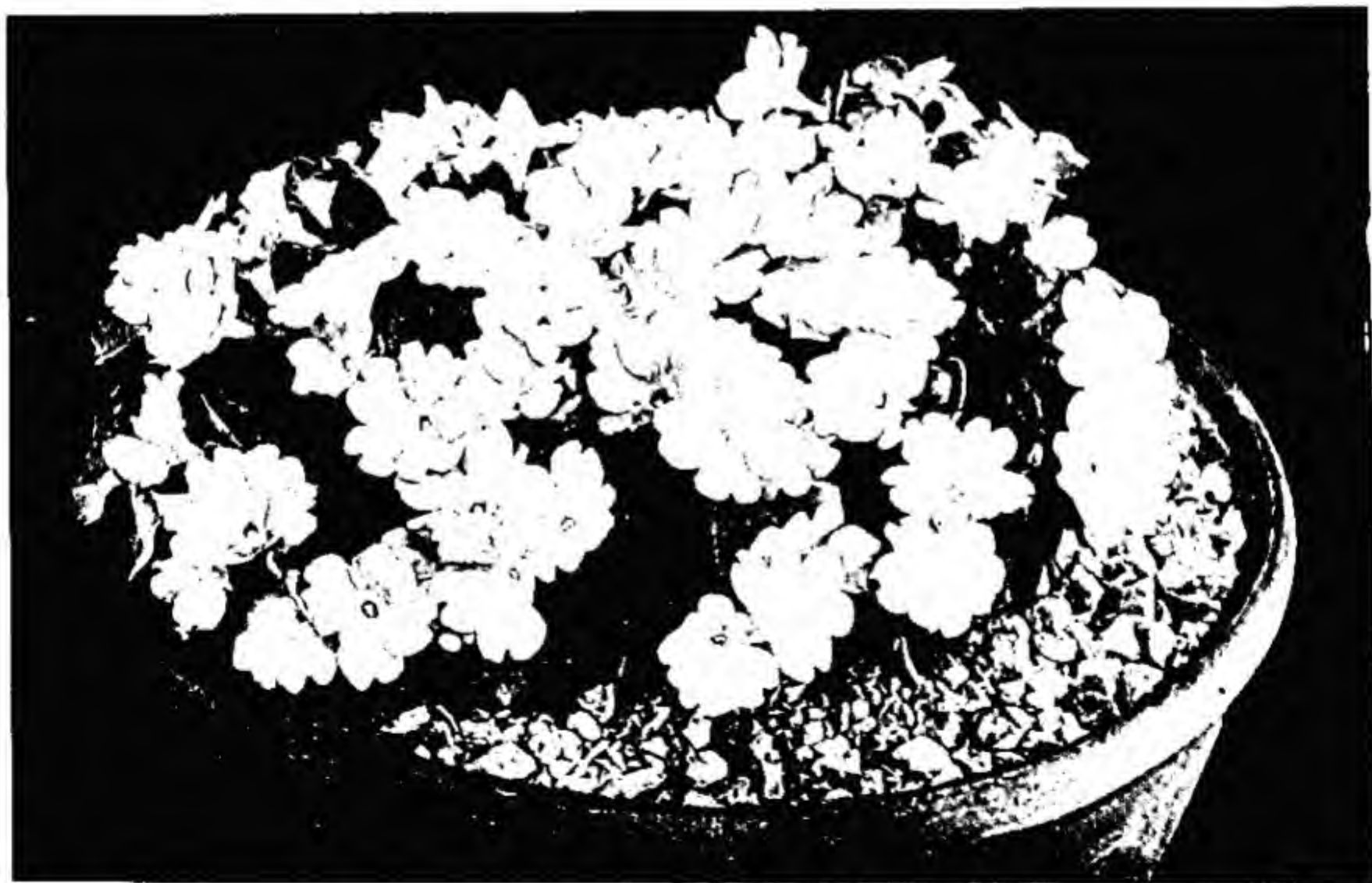
Populus lasiocarpa (*Poplar*). Hardy tree, large leaves, red stalks. 40-60 ft.



Potentilla fruticosa. Hardy sub-shrub, yellow flowers, summer. 4 ft.



Primula auricula (syn. *P. pubescens*). Hardy perennial, variously coloured flowers, spring. 6-8 in.



Primula allionii. Hardy rock plant, pink flowers, spring. 2 in.



Primula denticulata. Hardy perennial, variously coloured flowers, winter and spring. 12-15 in.



Primula helodoxa. Hardy perennial, yellow flowers, summer. 2-3 ft.



Primula malacoides. Greenhouse perennial, variously coloured flowers, winter and spring. 12-18 in.



Primula marginata. Hardy perennial, lavender flowers, spring. 3-6 in.



Primula nutans. Hardy perennial, deep lavender flowers, summer. 12-15 in.



Primula polyantha (*Polyanthus*). Hardy perennial, variously coloured flowers, spring. 9-12 in.



Primula sikkimensis. Hardy perennial, yellow flowers, summer. 1½-2 ft.



Primula sinensis stellata. Greenhouse perennial, variously coloured flowers, winter and spring. 9 in.



Prostanthera sieberi. Greenhouse evergreen shrub, lavender flowers, spring. 5-8 ft.



Protea longiflora. Greenhouse evergreen shrub, pink flowers, early spring. 6 ft.



Prunella laciniata. Hardy rock plant, purple flowers, July. 1 ft.



Prunus padus (Bird Cherry). Hardy tree, white flowers, May. 30-50 ft.



Prunus serrulata 'Kwanzan'. Hardy tree, deep rose flowers, April and May. 15-30 ft.



Prunus serrula tibetica (Birch-bark Cherry). Hardy tree, mahogany-coloured bark. 25-50 ft.



Prunus subhirtella. Hardy tree, pale pink flowers, April. 20-30 ft.



Prunus triloba (Flowering Almond). Hardy shrub, pink flowers, March and April. 12 ft.



Pseudolarix amabilis (Golden Larch). Hardy conifer, yellow foliage, golden in autumn. 100-130 ft.



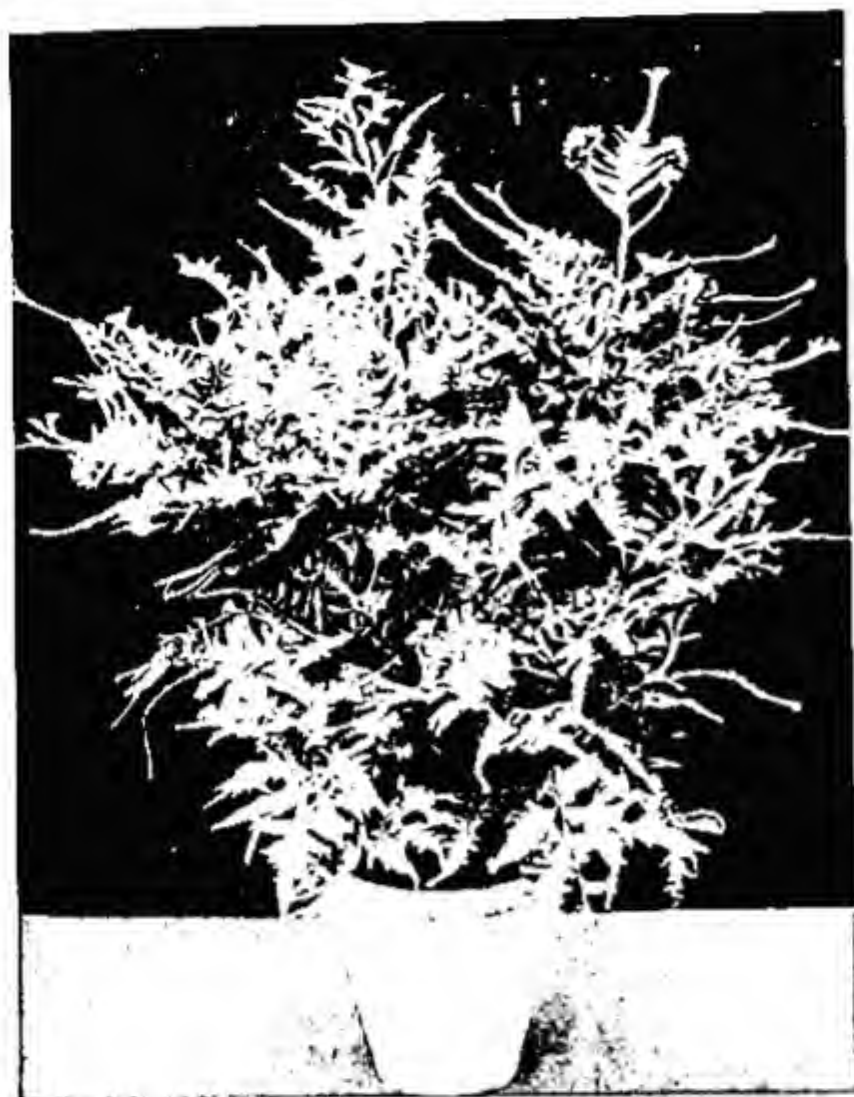
Pseudopanax discolor. Greenhouse evergreen foliage shrub. 15 ft.



Pseudosasa japonica (Bamboo). Hardy perennial grass. 10 ft.



Pseudotsuga taxifolia (Douglas Fir). Hardy evergreen conifer. 200-250 ft. (in nature).



Pteris cretica wimsetti. Greenhouse fern. Fronds up to 1 ft. high.



Pulmonaria angustifolia alba Lang-aort. Hardy rock plant, white flowers, spring. 1 ft.



Punica granatum (Pomegranate). Half-hardy tree, reddish-scarlet flowers, edible fruit. 15-30 ft.



Puschkinia scilloides. Hardy bulb, blue striped-white flowers, spring. 4 in.



Pyracantha crenatoserrata. Hardy evergreen shrub, white flowers, coral-red berries. 10-15 ft.



Pyrola rotundifolia (Wintergreen). Hardy rock plant, white flowers, June. 6-9 in.



Pyrus salicifolia (Willow-leaved Pear). Hardy tree, white flowers, spring. 30 ft.



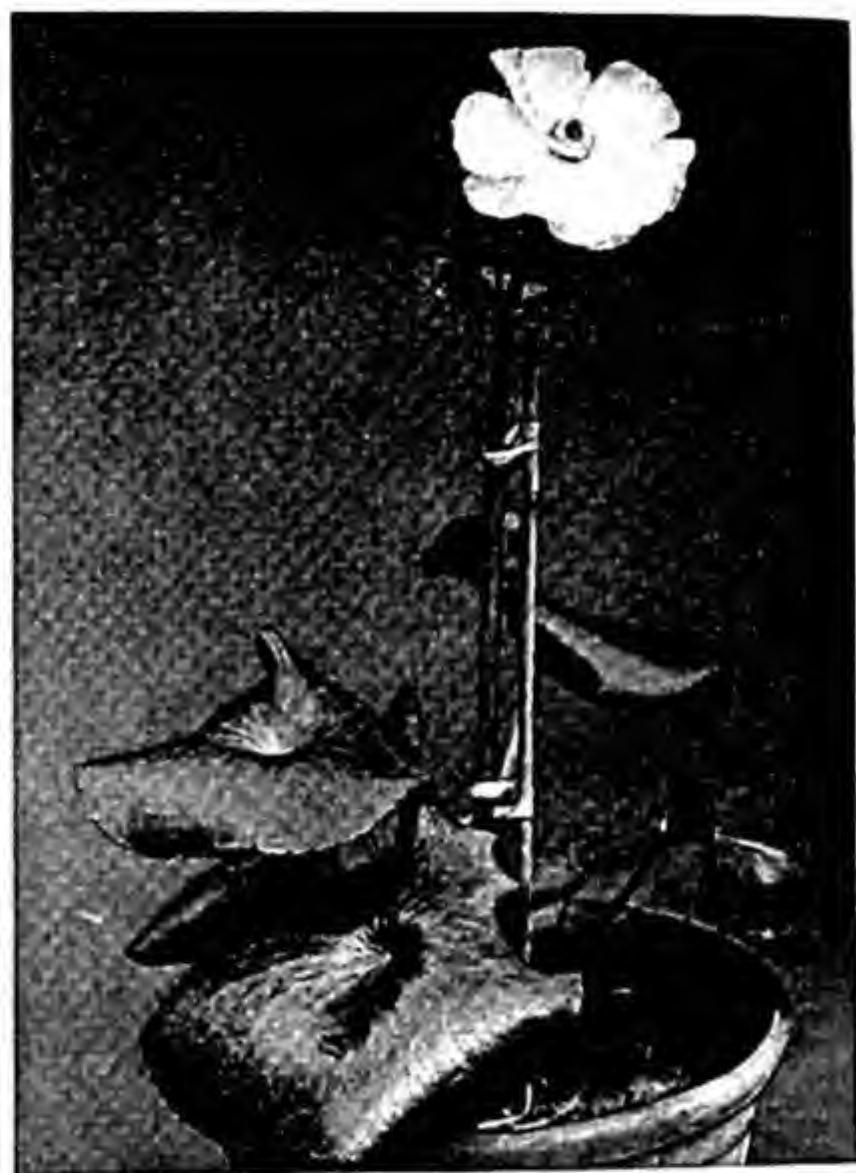
Quercus muhlenbergii (Chestnut Oak). Hardy tree. 60-100 ft.



Ramonda myconi. Hardy rock plant, purple flowers, spring. 3 in.



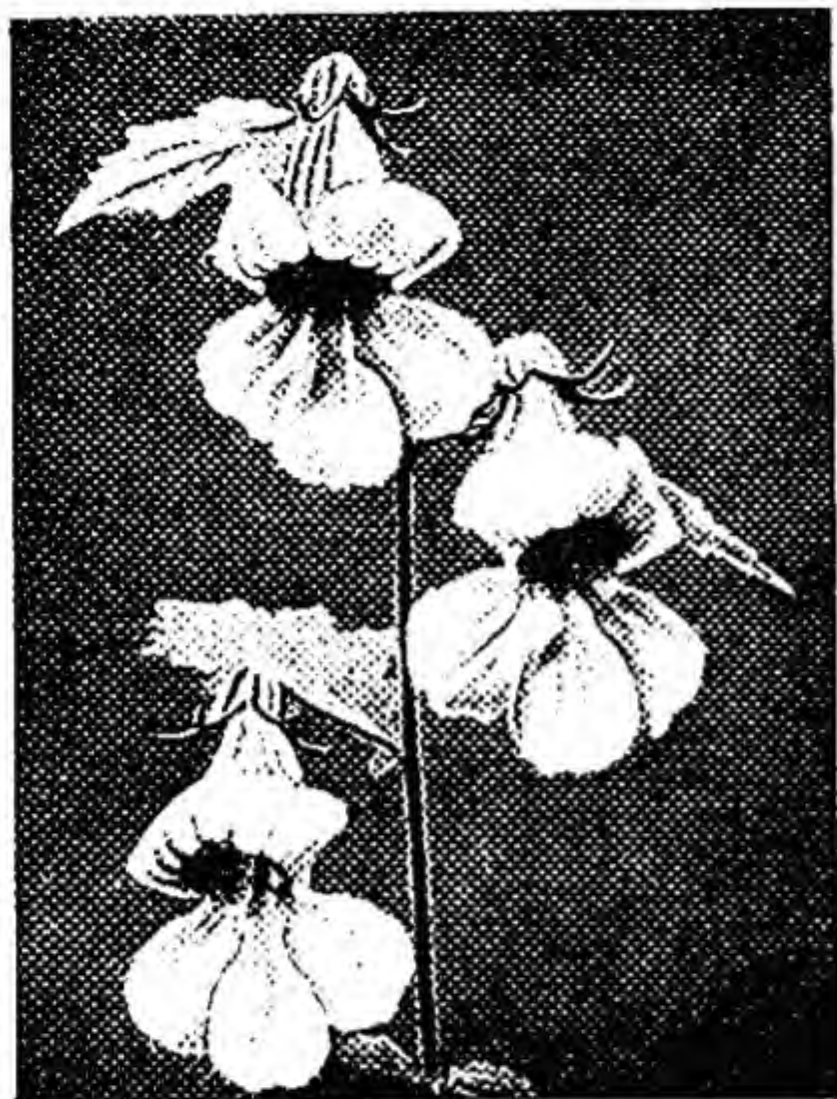
Ranunculus asiaticus. Hardy tuberous perennial, variously coloured flowers, summer. 6-12 in.



Ranunculus lyallii (New Zealand Mountain Lily). Hardy perennial, white flowers, spring. 4 ft.



Raoulia glabra. Hardy rock plant, emerald-green foliage, white flowers, spring. 1-2 in.



Rehmannia angulata. Half-hardy perennial, red and orange flowers, summer. 1-3 ft.



Reseda odorata (Mignonette). Nearly-hardy annual, yellow and white flowers, summer. 1-2 ft.



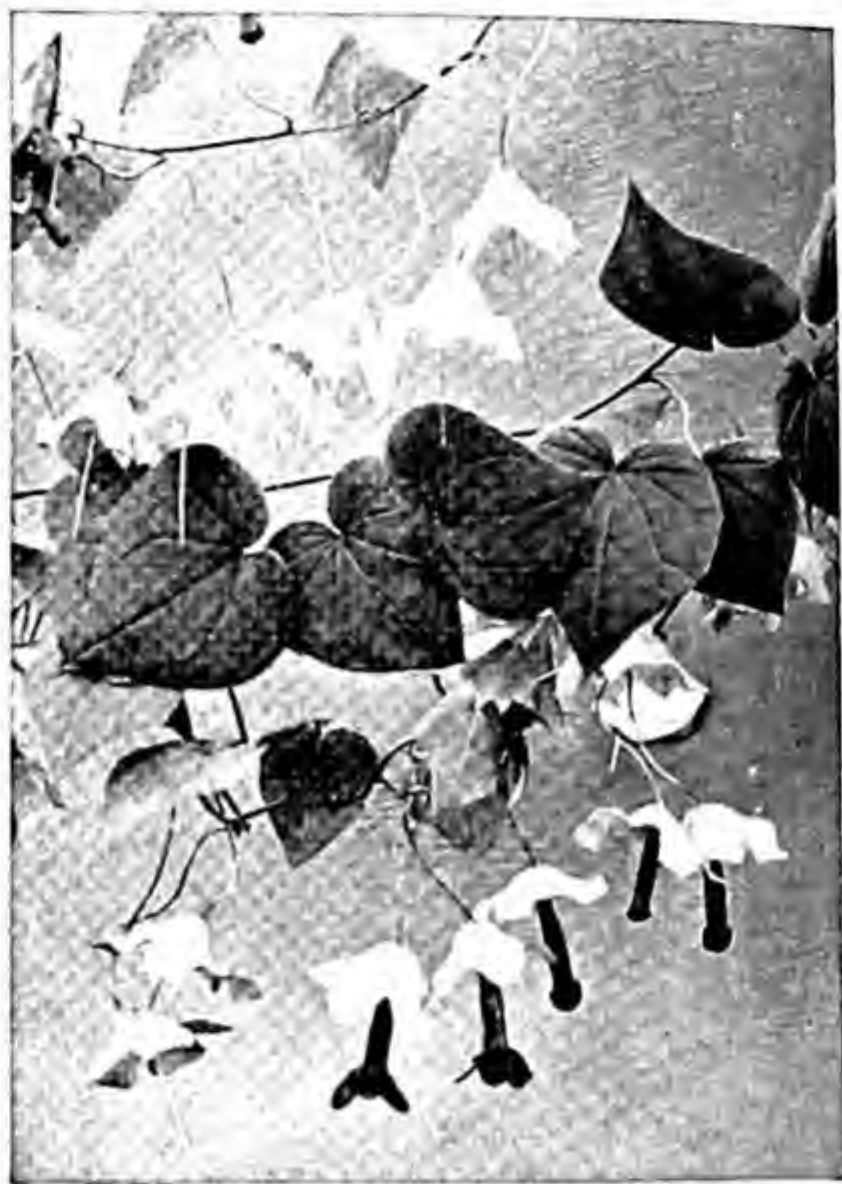
Rhamnus frangula (Buckthorn). Hardy deciduous tree. 15-20 ft.



Rheum palmatum (Ornamental Rhubarb). Hardy perennial foliage plant. 5-8 ft.



Rhipsalis baccifera. Greenhouse succulent shrub, yellow flowers, September. 1 ft.



Rhodochiton atrosanguineum. Greenhouse climber, reddish-purple flowers, summer. 10-15 ft.



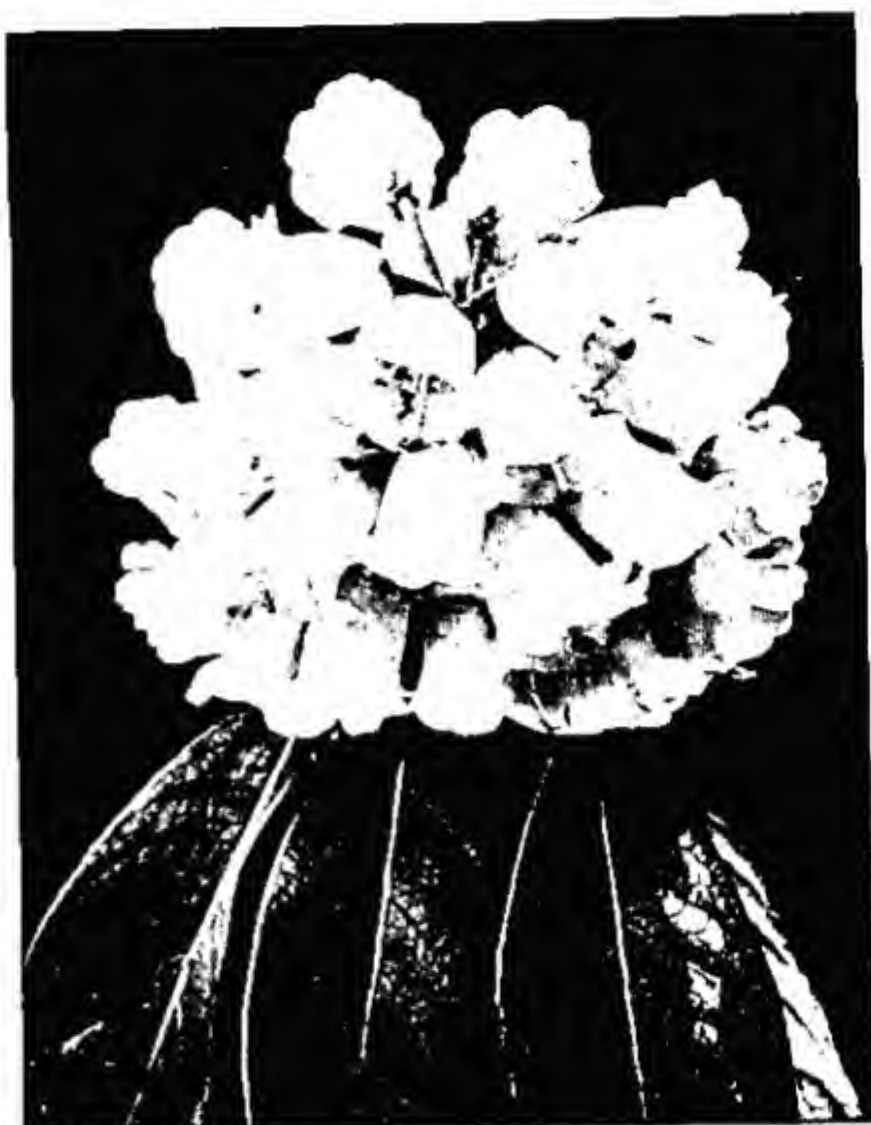
Rhododendron augustinii. Hardy shrub, soft blue flowers, May. 4-10 ft.



Rhododendron bullatum. Hardy shrub, white fragrant flowers, April and May. 8 ft.



Rhododendron campylocarpum. Hardy shrub, yellow flowers, April and May. 4-8 ft.



Rhododendron falconeri. Hardy tree, creamy-white flowers, April and May. 40-50 ft.



Rhododendron hippophaeoides. Hardy shrub, lavender to rose flowers, April. 2-3 ft.



Rhododendron keysii. Hardy evergreen shrub, red flowers, tipped yellow, June. 12 ft.



Rhododendron loderi. Hardy evergreen shrub, white flowers, flushed pink, summer. 20 ft.



Rhododendron molle (Azalea). Hardy shrub, yellow flowers, May. 4 ft.



Rhododendron obtusum 'Hinomayo' (Azalea). Evergreen shrub, pink flowers, early summer. 3 ft.



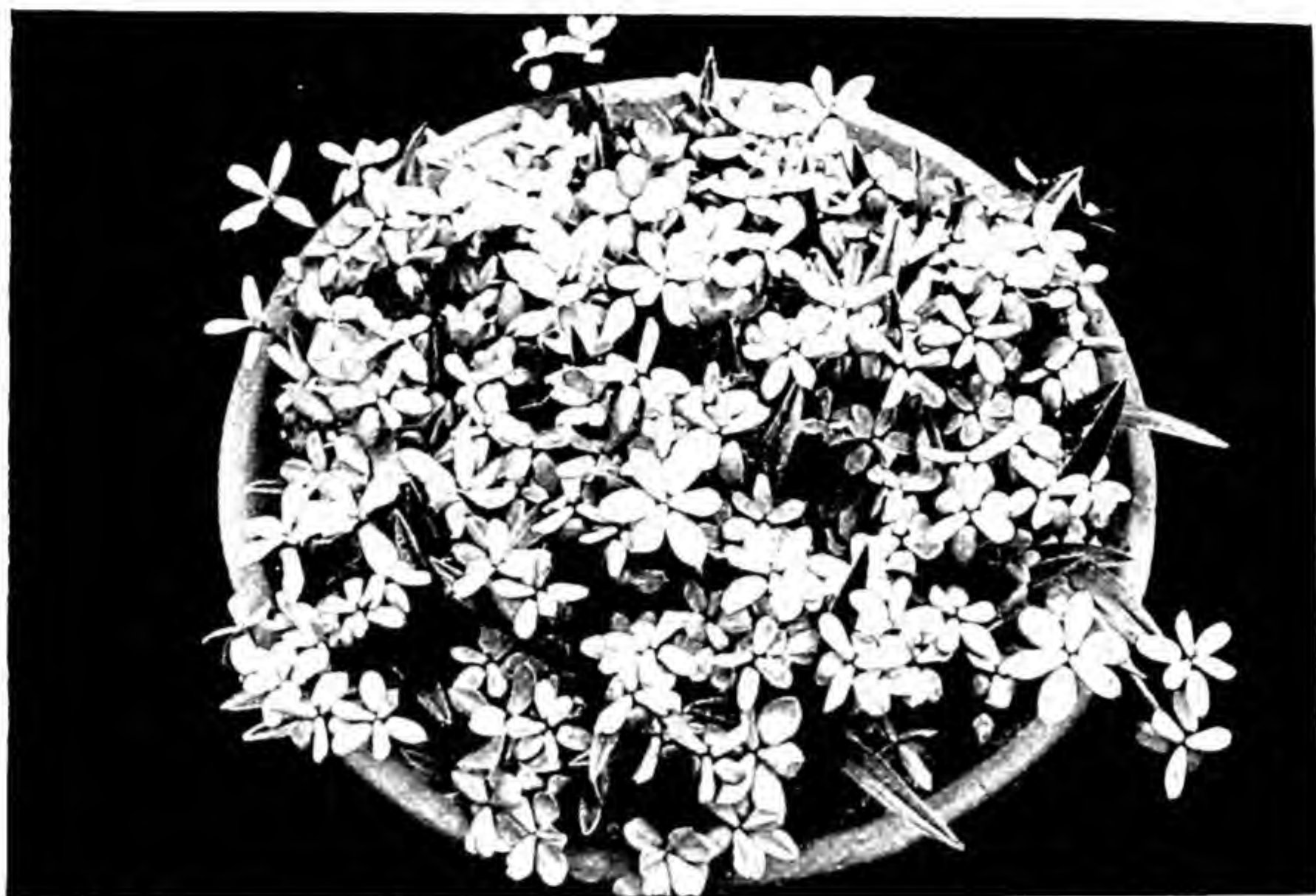
Rhododendron quinquefolium (Azalea). Hardy shrub, white flowers, spring. 3 ft.



Rhododendron thomsonii. Evergreen shrub, blood-red flowers, March. 8-12 ft.



Rhododendron vaseyi (Azalea). Hardy shrub, pink flowers, May. 15 ft.



Rhodohypoxis baueri. Hardy bulb, rose-red flowers, early summer. 2 in.



Rhodothamnus chamaecistus. Hardy shrub, pink flowers, spring. 6-12 in.



Rhodotypos scandens. Hardy shrub, white flowers, May to July. 4-6 ft.



Rhoecodiscus discolor. Greenhouse perennial or house plant, white flowers, summer, creeping.



Rhus typhina laciniata (Stag's Horn Sumach). Hardy tree crimson fruits. 15-25 ft.



Ribes sanguineum (Flowering Currant). Hardy shrub, scarlet-rose flowers, May. 6-8 ft.



Ricinus communis Ornamental-leaved tree, grown as half-hardy annual. 3-6 ft.



Robinia viscosa (Clammy Locust). Hardy tree, pale rose and yellow flowers, June. 30-40 ft.



Rochea coccinea. Greenhouse succulent, scarlet flowers, July. 1 ft.



Rodgersia pinnata. Hardy perennial, crimson flowers, summer. 2-3 ft.



Romneva coulteri (Californian Tree Poppy). Shrubby perennial, white flowers, late summer. 6 ft.



Romulea rosea. Slightly tender bulb, carmine flowers, spring. 6 in.



Rosa banksiae (Bankian Rose). Hardy climber, double or single yellow or white flowers. 20 ft.



Rosa centifolia muscosa (Moss Rose). Hardy shrub, variously coloured flowers, summer. 3-8 ft.



Rosa gallica versicolor (Rosa Mundi). Hardy shrub, crimson flowers, striped pink, summer. 4 ft.



Rosa hugonis. Hardy shrub, single yellow flowers, May. 8 ft.



Rosa moyesii. Hardy shrub, velvety red flowers, June, bottle-shaped scarlet fruits. 6-10 ft.



Rosa multiflora 'Blush Rambler'. Hardy climber, pale pink flowers, June. 10-15 ft.



Rosa rugosa. Hardy shrub, purplish-rose flowers, June, 6 ft.



Rosa 'Barbara Richards' (Hybrid Tea Rose). Hardy shrub, yellow and pink flowers, summer, 3-4 ft.



Rosa 'Frensham' (Floribunda Rose). Hardy shrub, intense scarlet flowers, summer, 3-4 ft.



Rosa 'Orange Triumph' (Floribunda Rose). Hardy shrub, scarlet-tinged orange flowers, summer, 3-4 ft.



Roscoea cauleoides. Hardy perennial, pale yellow flowers, summer, 9-12 in.



Rosmarinus officinalis (Rosemary). Hardy evergreen shrub, violet-blue flowers, May, 4-7 ft.



Rubus cockburnianus. Hardy shrub, purple flowers, white stems, 8-10 ft.



Rubus deliciosus (Rocky Mountain Flowering Raspberry). Hardy shrub, white flowers, May, 10 ft.



Rudbeckia laciniata portensis (Coneflower). Hardy perennial, yellow flowers, summer. 3-6 ft.



Rudbeckia speciosa (Coneflower). Hardy perennial yellow and black flowers, summer. 1½-3 ft.



Ruellia macrantha. Stove shrub, rosy-purple flowers, winter. 6 ft.



Ruscus aculeatus (Butcher's Broom). Hardy evergreen, scarlet berried shrub, green flowers, May. 3 ft.



Sabatia campestris. Hardy bulb, rose-pink flowers, summer. 6-12 in.



Sagina glabra (Pearlwort). Hardy perennial, white flowers, summer. 2 in.



Sagittaria sagittifolia pleniflora (Double Arrowhead). Hardy aquatic, white flowers, summer. 2 ft.



Saintpaulia ionantha (African Violet). Greenhouse perennial, blue flowers, summer. 3-4 in.



Salix caprea (Goat Willow). Hardy tree, yellow catkins. 15-20 ft.



Salpiglossis sinuata. Half-hardy annual, variously coloured flowers, summer. 2 ft.



Salvia fulgens. Half-hardy perennial, scarlet flowers, summer. 9-15 in.



Salvia patens. Half-hardy perennial, blue flowers, summer. 2-3 ft.



Salvinia auriculata. Tender, floating, flowerless annual aquatic, pea-green foliage.



Sambucus canadensis (Canadian Elder). Hardy shrub, white flowers, July, black berries, 12 ft.



Sandersonia aurantiaca. Greenhouse tuberous-rooted climber, orange-yellow flowers, summer, 3-6 ft.



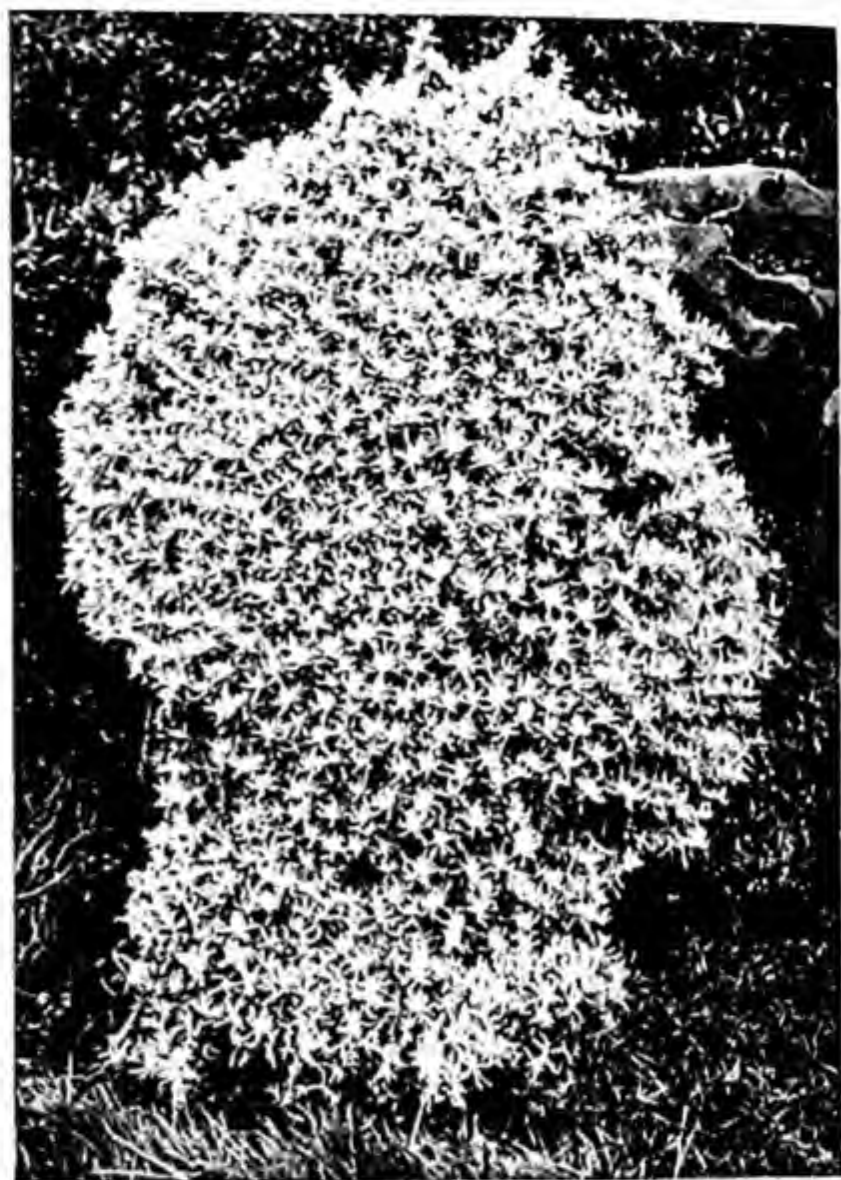
Sanguinaria canadensis multiplex (Bloodroot). Hardy perennial, white flowers, spring, 6 in.



Sanguisorba obtusa (Burnet). Hardy perennial, pink flowers, July to September, 2-3 ft.



Sansevieria trifasciata Laurentii. Stove perennial or house plant, leaves striped golden-yellow.



Santolina chamaecyparissus (Lavender Cotton). Hardy shrub, yellow flowers, July. 1-2 ft.



Saponaria ocymoides (Soap-wort). Hardy rock plant, rosy-purple flowers, summer. 9 in.



Sarracenia hybrid (Pitcher Plant). Half-hardy perennial, purple-veined tubular leaves. 1-2 ft.



Satureja grandiflora (Savory). Hardy perennial, purple flowers, June. 12-18 in.



Sauromatum guttatum. Half-hardy perennial purple and green flowers, winter or spring. 1½-2 ft.



Saxifraga burseriana (Cushion Saxifrage). Hardy rock plant, white flowers, March. 3 in.



Saxifraga camposii (*Mossy Saxifrage*). Hardy rock plant, white flowers, spring. 6 in.



Saxifraga geum. Hardy rock plant, white flowers, summer. 4-6 in.



Saxifraga grisebachii. Hardy rock plant, crimson flowers, March and April. 9 in.



Saxifraga latepetiolata. Hardy biennial, white flowers, spring. 12-15 in.



Saxifraga longifolia (*Encrusted Saxifrage*). Hardy rock plant, white flowers, summer. 2 ft.



Saxifraga oppositifolia. Hardy rock plant, pink flowers, March and April. 2 in.



Saxifraga stolonifera. Almost hardy perennial, white flowers, spotted pink, summer. 9-12 in.



Saxifraga taygetea. Hardy rock plant, white flowers, pink-spotted, early summer. 6 in.



Scabiosa atropurpurea (Sweet Scabious). Hardy annual, variously coloured flowers, summer. 3 ft.



Schisandra grandiflora. Hardy climbing shrub, red flowers, spring. 10-20 ft.



Schizanthus hybridus. Half-hardy annual, variously coloured flowers, spring and summer. 1-3 ft.



Schizopetalon walkeri. Half-hardy annual, white flowers, summer. 6-9 in.



Schizophragma hydrangeoides. Hardy climber, yellowish-white flowers, July. 20-30 ft.



Schizostylis coccinea (Kaffir Lily). Hardy perennial, scarlet flowers, autumn. 1-3 ft.



Sciadopitys verticillata (Umbrella Pine). Hardy evergreen tree. 80-120 ft.



Scilla hispanica (Spanish Squill). Hardy bulb, blue flowers, May. 1-1½ ft.



Scilla peruviana. Hardy bulb, lilac flowers, May. 6-12 in.



Scirpus Tabernaemontani zebrinus. Hardy perennial aquatic, white-banded stems. 4-5 ft.



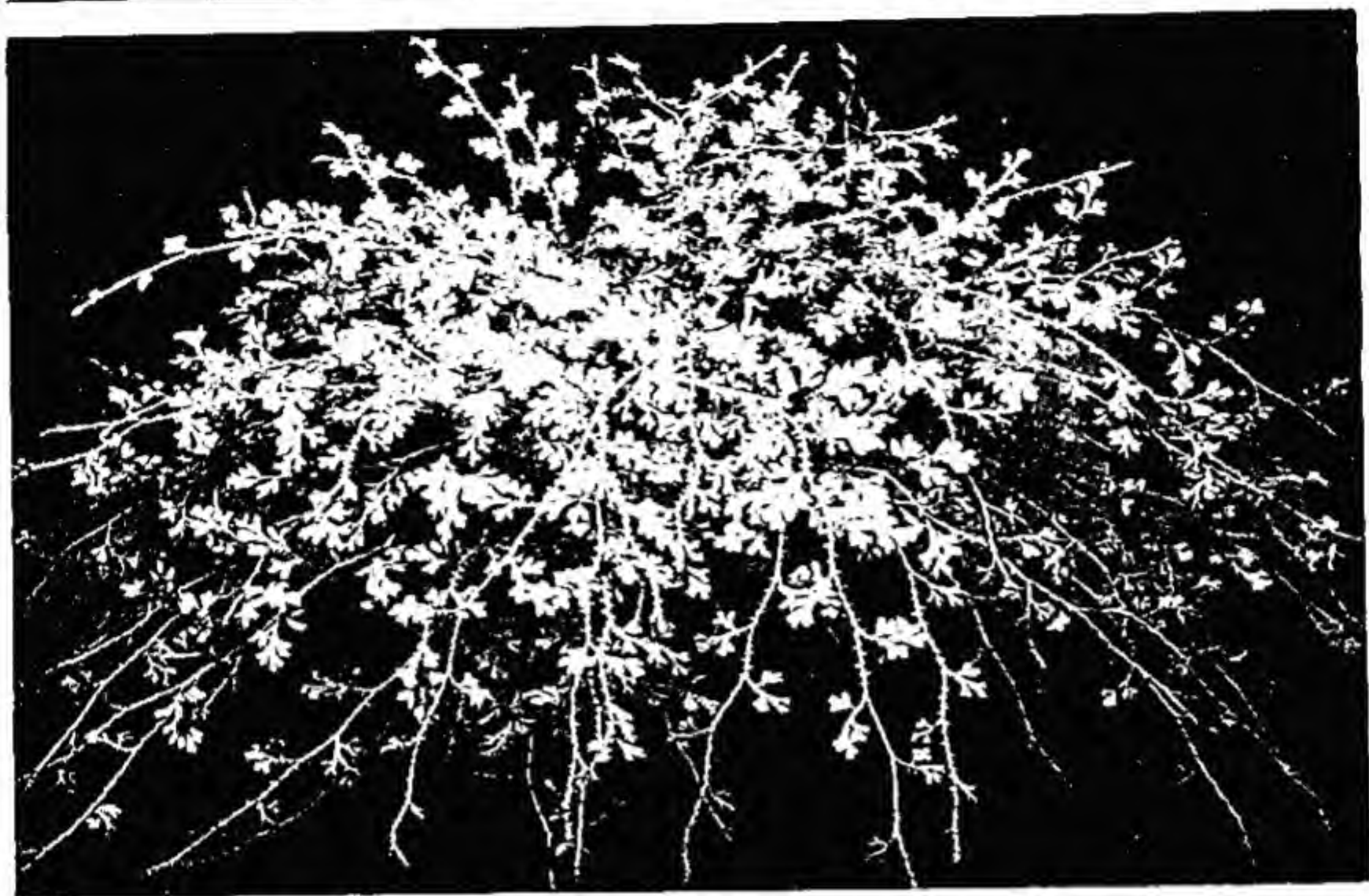
Scutellaria indica japonica. Hardy perennial lavender flowers, summer. 1 ft.



Sedum reflexum (Stonecrop). Hardy rock plant, yellow flowers, summer. 8-10 in.



Sedum spectabile. Hardy perennial, pink flowers, August and September. 1 ft.



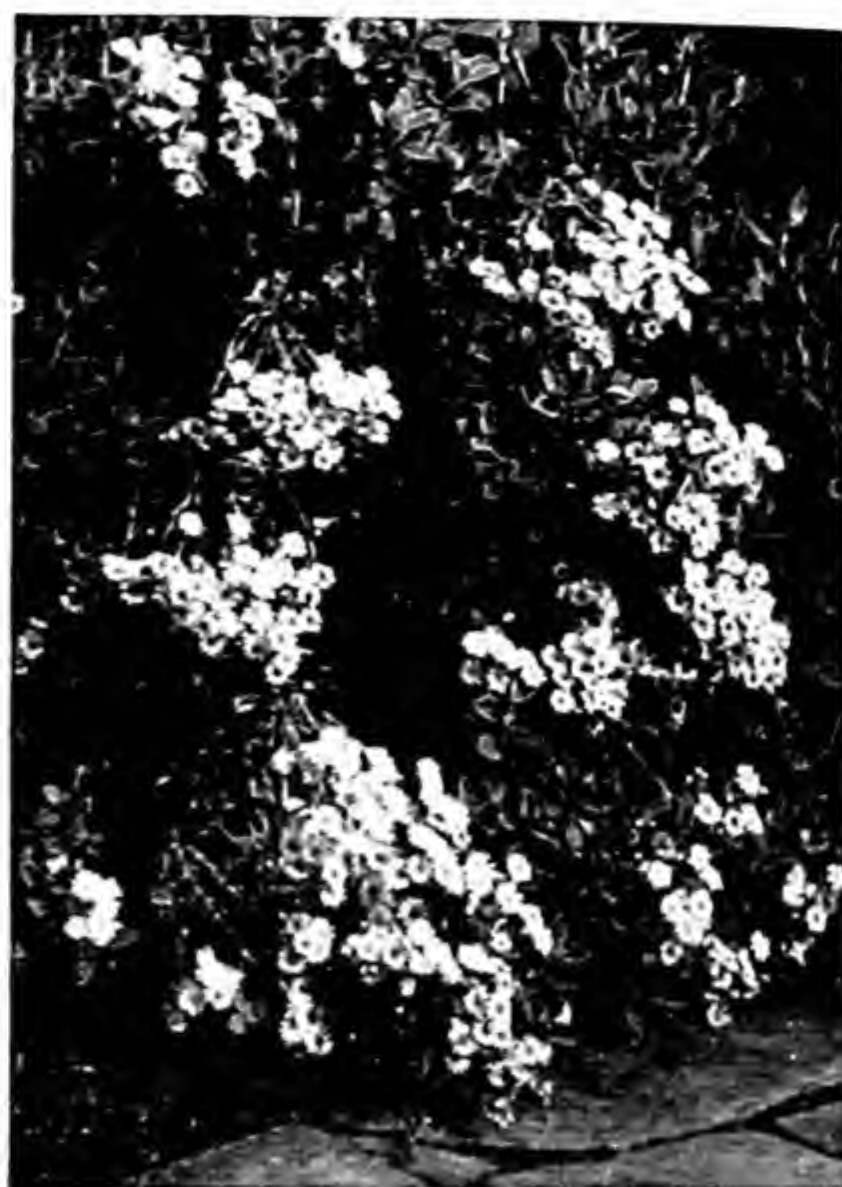
Selaginella uncinata. Greenhouse evergreen moss-like plant. Trailing.



Sempervivum tectorum (Houseleek). Hardy succulent-leaved perennial, flowers purple, summer. 6 in.



Senecio cruentus (Cineraria). Greenhouse perennial, variously coloured flowers, winter and spring, 2 ft.



Senecio greyii. Hardy shrub yellow flowers, summer, 8 ft.



Senecio pulcher. Hardy perennial, red-purple flowers, summer, 2-4 ft.



Sequoiadendron giganteum (Wellingtonia). Hardy evergreen conifer. To 100 ft. or more.



Shortia uniflora. Hardy perennial, pink flowers, spring. 6 in.



Sidalcea malviflora. Hardy perennial, pink to crimson flowers, summer. 3 ft.



Silene hookeri. Hardy rock plant, pink and white flowers, summer. 2 in.



Silphium perfoliatum (Cup Plant). Hardy perennial, yellow flowers, August and September. 6-8 ft.



Sinningia speciosa (Gloxinia). Tender perennial variously coloured flowers, summer. 6-12 in.



Siphonosmanthus delavayi (Syn. *Osmanthus Delavayi*). Hardy shrub, white flowers, April. 5-10 ft.



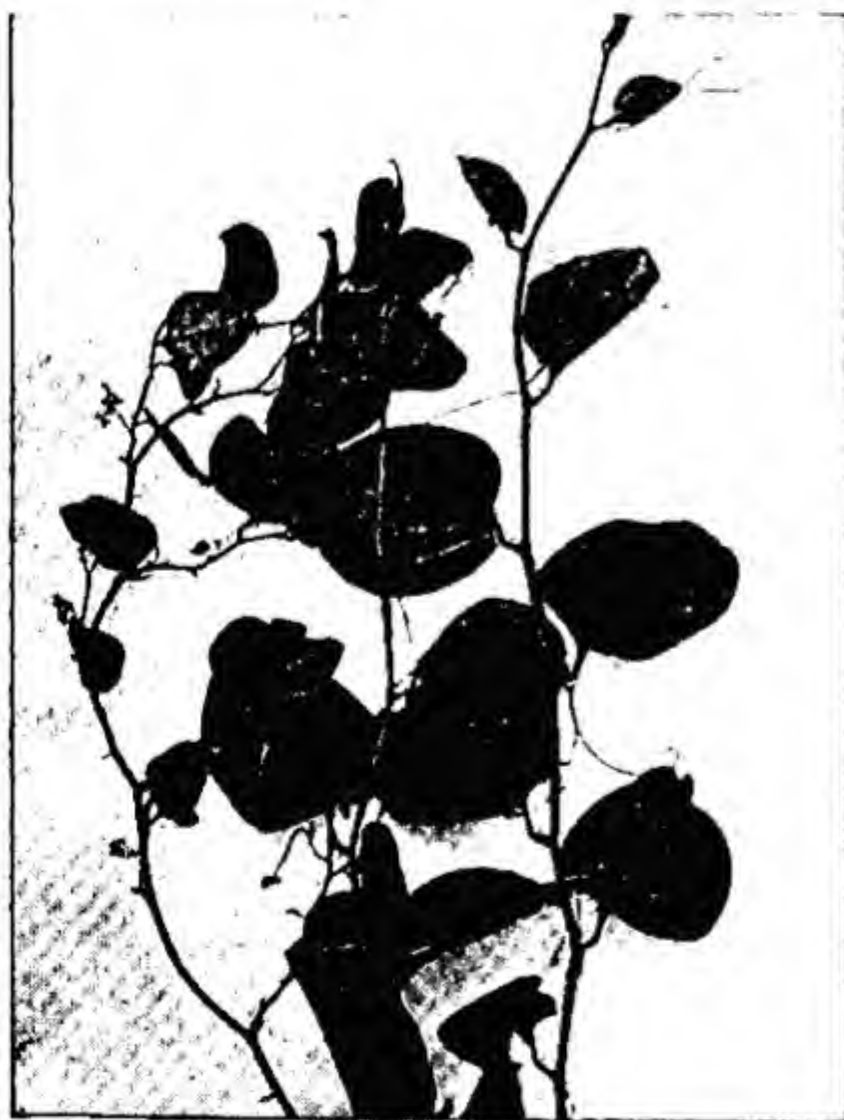
Sisyrinchium bermudiana. Hardy perennial, blue flowers, summer. 12-15 in.



Skimmia japonica. Hardy shrub, white flowers, April, scarlet fruits. 3-4 ft.



Smilacina racemosa (False Spikenard). Hardy perennial, white flowers, May. 3 ft.



Smilax rotundifolia. Hardy, nearly evergreen climber, greenish-yellow flowers, black berries.



Smithiantha cinnabarina. Greenhouse tuberous perennial, scarlet flowers, summer. 2 ft.



Solanum capsicastrum (*Winter Cherry*). Greenhouse shrub, white flowers, summer, scarlet fruit, winter. 1-2 ft.



Solanum jasminoides (*Jasmine Nightshade*). Hardy climber, blue flowers, summer. 15-20 ft.



Soldanella alpina. Hardy rock plant, blue flowers, April. 3 in.



Solidago hybrida (*Golden Rod*). Hardy perennial, yellow flowers, August. 2-5 ft.



Sophora tetraptera microphylla. Slightly tender evergreen shrub, yellow flowers, June. 8-12 ft.



Sophronitis coccinea. Epiphytic orchid, scarlet flowers, winter. 6-8 in.



Sorbaria arborea (False Spirea). Hardy shrub, white flowers, July and August. 18 ft.



Sorbus hupehensis. Hardy tree, white flowers, May, pink berries. 15-25 ft.



Sparaxis tricolor. Half-hardy bulb, orange-yellow and black flowers, May. 1-2 ft.



Sparmannia africana. Greenhouse shrub, white flowers, summer. 10-15 ft.



Spartium junceum (Spanish Broom). Hardy shrub, yellow flowers, summer. 6-10 ft.



Spiraea douglasii. Hardy shrub, purplish-rose flowers, summer. 4-6 ft.



Spiraea henryi. Hardy shrub, cream flowers, June. 6-8 ft.



Spiranthes romanzoffiana. Terrestrial orchid, white flowers, summer. 4-10 in.



Sprekelia formosissima. Tender bulb, crimson flowers, June. 2 ft.



Stachys lanata (*Lamb's Ear*). Hardy perennial, white, woolly leaves, purple flowers, summer. 1 ft.

Stachyurus praecox. Hardy shrub, pale yellow flowers, February. 5-10 ft.



Stanhopea tigrina. Stove epiphytic orchid, crimson and yellow flowers, summer.



Stapelia variegata (Carrion Flower). Greenhouse succulent, green and purple flowers, August. 4-6 in.



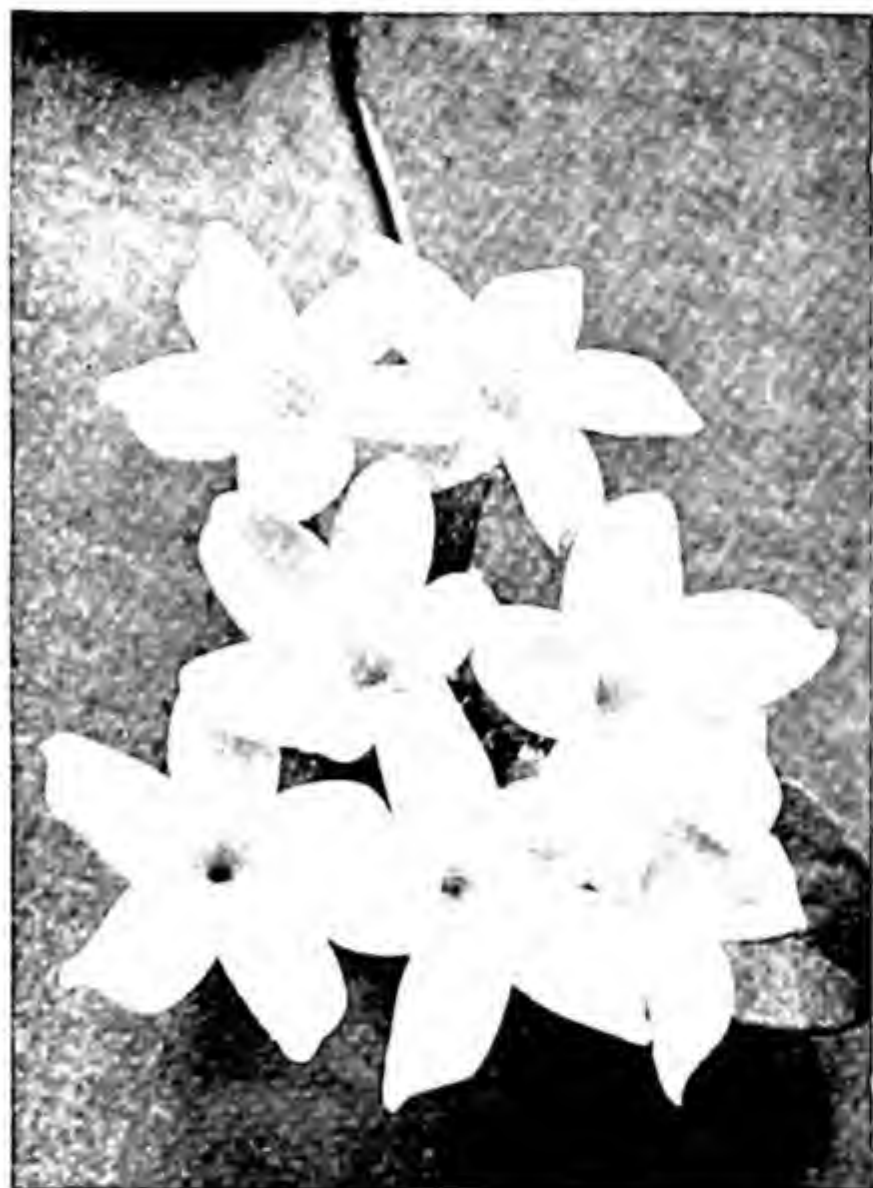
Staphylea colchica. Hardy shrub, white flowers, May. 6-10 ft.



Stenanthium robustum. Hardy perennial, white flowers, summer. 4-5 ft.



Stephanandra incisa. Hardy shrub, greenish-white flowers, June. 4-8 ft.



Stephanotis floribunda. Greenhouse shrub, white flowers, spring and summer. 10-15 ft.



Sternbergia lutea. Hardy bulb, yellow flowers, autumn. 6 in.



Stewartia ovata. Hardy shrub, white flowers, July. 10-15 ft.



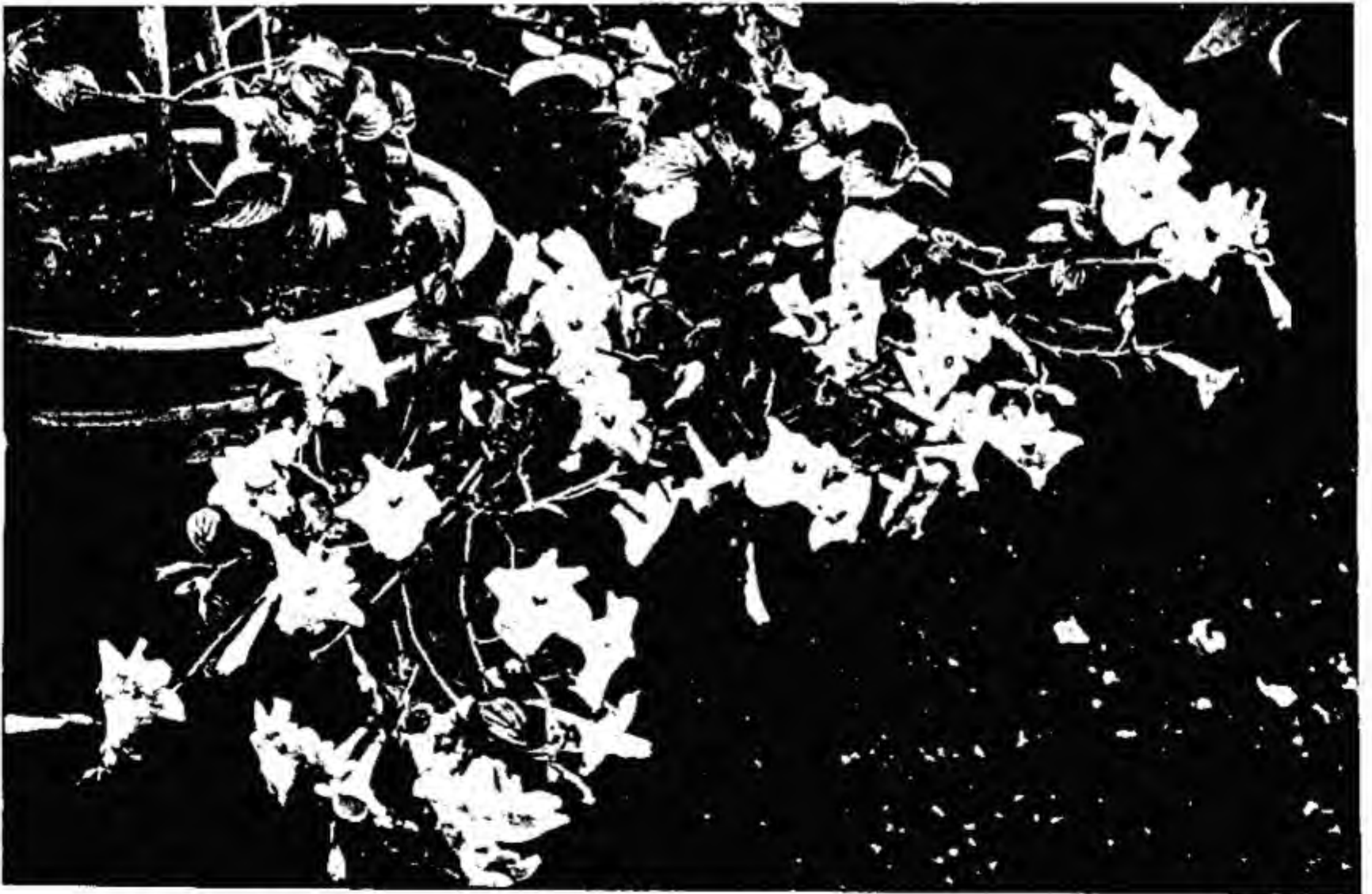
Stokesia laevis. Hardy perennial, blue flowers August. 1½ ft.



Strelitzia reginae (Bird of Paradise Flower). Greenhouse perennial, orange and blue flowers. 3-4 ft.



Streptocarpus hybridus. Greenhouse perennial, variously coloured flowers, summer. 6-12 in.



Streptosolen jamesonii. Greenhouse evergreen climber, orange flowers, summer. 4-6 ft.



Strobilanthes gossypinus. Stove evergreen shrub, purple flowers. 2 ft.



Styrax japonica. Hardy shrub, white flowers, June. 12-25 ft.



Sycopsis sinensis. Hardy tree, red and yellow flowers, February. 15-25 ft.



Symphoricarpos albus (Snowberry). Hardy shrub, pink flowers, June, white berries. 8-10 ft.



Symphyandra pendula. Hardy perennial, straw-yellow flowers, summer. 9-12 in.



Symphytum asperum (Prickly Comfrey). Hardy perennial, flowers rose turning blue, summer. 3-6 ft.



Synthyris stellata. Hardy rock plant, violet-blue flowers, early summer. 4-9 in.



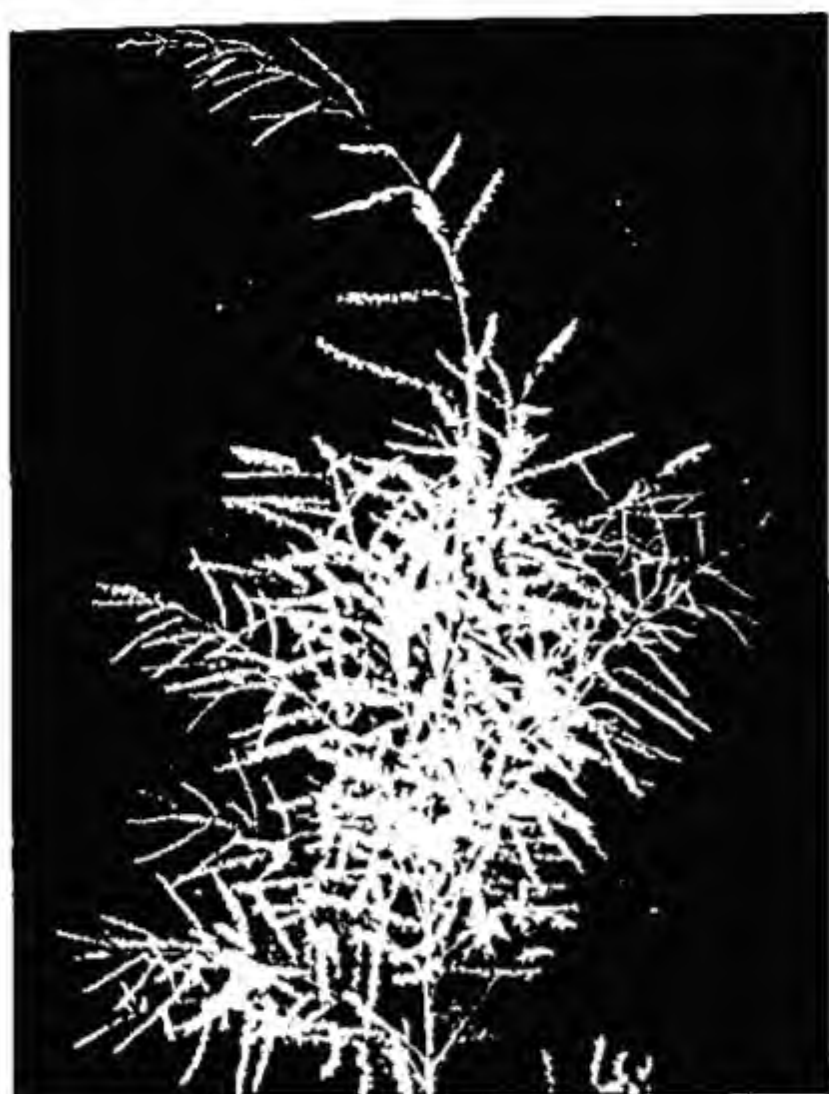
Syringa vulgaris (Lilac). Hardy shrub, flowers white to deep purple or pale yellow. 10-20 ft.



Tacca cristata. Stove perennial, brownish-purple flowers, summer. 2 ft.



Tagetes erecta (African Marigold). Half-hardy annual, yellow or orange flowers, summer. 2-3 ft.



Tamarix pentandra (Tamarisk). Hardy shrub, pink flowers, August and September. 6-15 ft.



Tanacetum vulgare (Tansy). Hardy perennial, yellow flowers, summer. 2-3 ft.



Tanakaea radicans. Hardy rock plant, white flowers, April to June. 6-9 in.



Taxodium distichum (Swamp Cypress). Hardy deciduous conifer. 70-100 ft.



Taxus baccata (Yew). Hardy evergreen conifer, yellow fruit, autumn. 30-40 ft.



Tecophilaea cyanocrocus (Chilean Crocus). Half-hardy bulb, blue flowers, spring. 6 in.



Telopea speciosissima (Waratah). Half-hardy shrub, rose flowers, June. 8 ft.



Teucrium scordonia (Germander). Hardy perennial, yellow flowers, summer. 2 ft.



Thalia dealbata. Half-hardy aquatic perennial, purple flowers, June. 6 ft.



Thalictrum aquilegifolium. Hardy perennial, lilac flowers, summer. 3 ft.



Thalictrum delavayi. Hardy perennial, rosy-lilac flowers, summer. 5-6 ft.



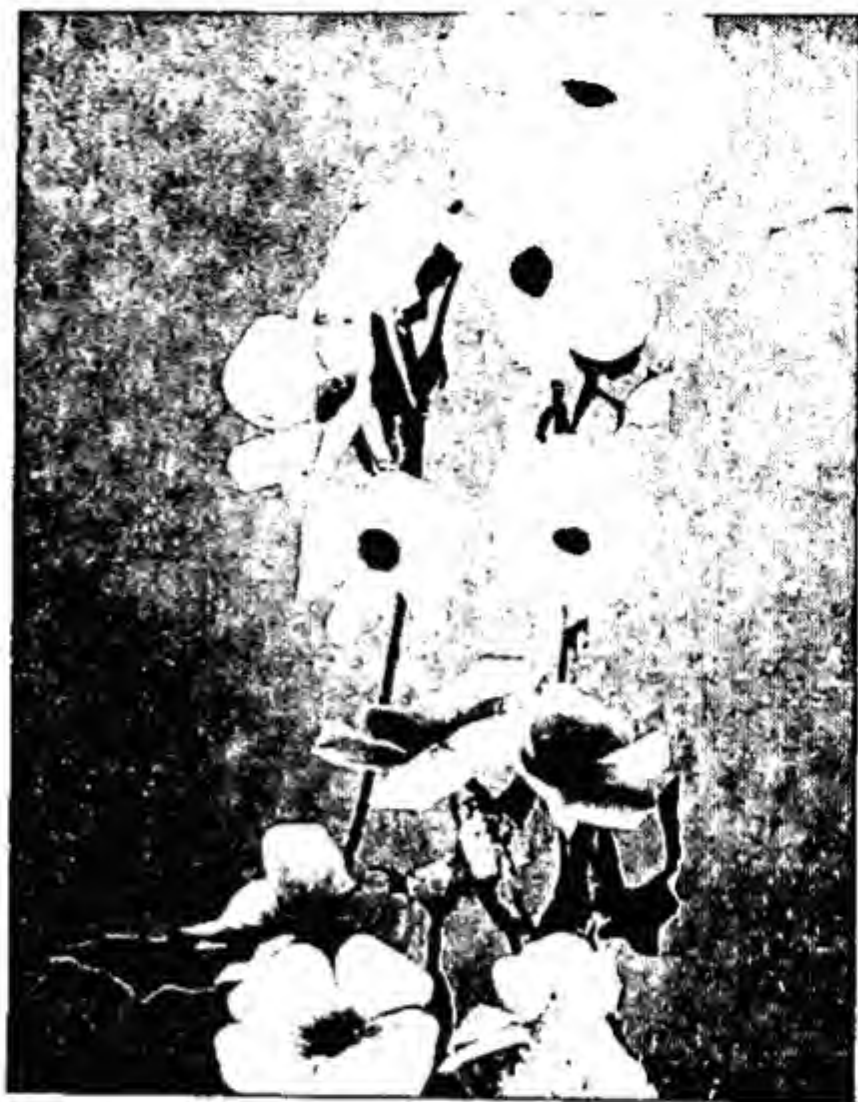
Thermopsis montana. Hardy perennial, golden-yellow flowers, summer. 2 ft.



Thlaspi alpinum. Hardy rock plant, white flowers, spring. 3-4 in.



Thuja plicata (*Western Arbor-vitae*). Hardy evergreen conifer, 100 ft.



Thunbergia alata. Annual greenhouse climber, yellow and purple flowers, summer. 4-6 ft.



Thymus serpyllum (*Thyme*). Hardy sub-shrub, rosy-lilac flowers, June. 1 in.



Tiarella cordifolia (*Foam Flower*). Hardy perennial, white flowers, June. 1 ft.



Tibouchina semidecandra. Greenhouse shrub, purple flowers, spring. 5-10 ft.



Tigridia pavonia (Tiger Flower). Half-hardy bulb yellow, red and purple flowers, summer. 1-2 ft.



Tilia americana (American Linden). Hardy deciduous tree. 60-120 ft.



Tillandsia lindeniana. Stove epiphytic perennial, bluish-purple flowers, summer. 1 ft.



Tolpis barbata. Hardy annual, yellow flowers, June. 1-2 ft.



Torenia fournieri. Greenhouse annual, lilac, violet and yellow flowers, summer. 1 ft.



Trachelium caeruleum (Blue Throatwort). Half-hardy perennial, blue flowers, August. 2 ft.



Trachelospermum jasminoides. Half-hardy shrub, white flowers, July and August. 10-12 ft.



Trachycarpus fortunei. Greenhouse palm. Hardy in the south. 25-30 ft.

Trachymene caerulea (Blue Lace Flower). Half-hardy annual, blue flowers, June. 8 in.



Tradescantia virginiana (Spiderwort). Hardy perennial, purple or rose flowers, summer. 1-1½ ft.



Trapa natans (Water Chestnut). Tender aquatic, white flowers, summer.



Trichopilia coccinea. Stove epiphytic orchid, whitish-crimson flowers, early summer.



Trillium grandiflorum. Hardy tuberous-rooted perennial, white flowers, May. 1-1½ ft.



Tritonia crocata. Hardy corm, orange-red flowers, summer. 2 ft.



Trollius europaeus. Hardy perennial, yellow flowers, May and June. 1½-2 ft.



Tropaeolum majus. Half-hardy annual, yellow to red flowers, summer. 5-10 ft.



Tsuga canadensis (syn. *Abies canadensis*). Hardy evergreen conifer. 70-90 ft.



Tulipa gesneriana (Darwin Tulip). Hardy bulb, various coloured flowers, May. 2 ft.



Tulipa gesneriana 'Willemssoord' (Double Tulip). Hardy bulb, claret-red and white flowers, May. 12 in.



Tulipa gesneriana dracontia (Parrot Tulip).
Variously coloured flowers, May. 2 ft.



Tulipa gesneriana 'Gizela' (Lily-flowered Tulip).
Bright red flowers, May. 2 ft.



Tulipa kaufmanniana (Water Lily Tulip). Hardy bulb, white, red and yellow flowers, March. 6 in.



Tunica saxifraga pleniflora. Hardy rock plant, double pink flowers, June to September. 6 in.



Typha angustifolia (Reed Mace). Hardy aquatic perennial, brown flowers, July. 8-10 ft.



Ulex europaeus plenus (Double Gorse). Hardy evergreen shrub, yellow flowers, spring. 4-5 ft.

u



Ulmus glabra pendula (Weeping Elm). Hardy tree. 20-40 ft.



Umbilicus rupestris (Wall Pennywort). Succulent perennial, greenish-yellow flowers, summer. 8-12 in.



Ursinia anethoides. Half-hardy annual, orange flowers, summer. 1 ft.



Umbellularia californica. Slightly tender, ever-green tree, yellowish-green flowers. 20-80 ft.



Uvularia grandiflora. Hardy perennial, yellow flowers, May. 1 ft.



Vaccinium vitis-idaea (Cowberry). Hardy evergreen shrub, pink or white flowers, summer. 6-8 in.



Vallisneria spiralis (Eel Grass). Half-hardy aquatic, minute white flowers, June.



Vallota speciosa (Scarborough Lily). Greenhouse bulb, red flowers, August-September. 2-3 ft.



Vanda caerulea. Epiphytic orchid, blue flowers, autumn.



Veltheimia capense. Greenhouse bulb, red-tinged yellow flowers, winter. 1-1½ ft.



Venidium fastuosum. Half-hardy annual, yellow and purplish-black flowers, summer. 2-2½ ft.



Veratrum album (False Hellebore). Hardy perennial, white flowers, July. 3-4 ft.



Verbascum thapsiforme. Hardy perennial, yellow flowers, summer. 5 ft.



Verbena bonariensis. Half-hardy perennial, purplish-lilac flowers, summer. 4-5 ft.



Verbena teucrioides. Half-hardy perennial, variously coloured flowers, summer. 1 ft.



Vernonia crinita (Ironweed). Hardy perennial, purple flowers, autumn. 4-12 ft.



Veronica incana. Hardy perennial, white, blue or pink flowers, July. 12-18 in.



Viburnum davidii. Hardy evergreen shrub, white flowers, June, blue fruits. 2 ft.



Viburnum rhytidophyllum roseum. Hardy evergreen shrub, pink flowers, May and June. 10 ft.



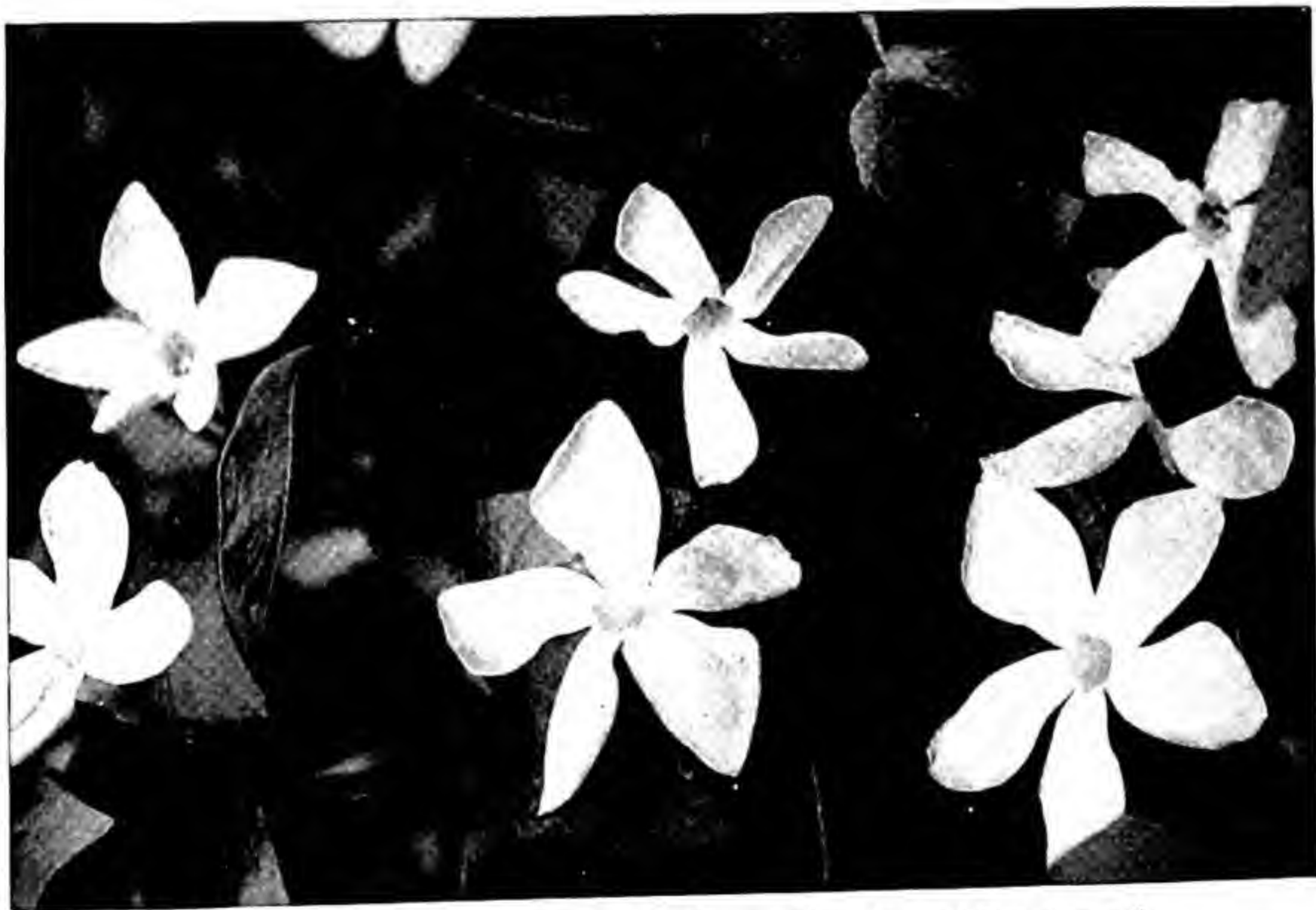
Viburnum tinus (*Laurustinus*). Hardy evergreen shrub, white or pinkish flowers, winter. 10 ft.



Viburnum plicatum mariesii. White flowers, early summer, red fruits, turning black. 10 ft.



Victoria amazonica (syn. *V. regia*). *Stove aquatic, white, rose and purple flowers, summer.*



Vinca difformis. *Hardy shrub, pale lilac flowers, November and December. 1 ft.*



Viola odorata 'Cœur d'Alsace' (*Sweet Violet*). Hardy perennial, rose flowers, winter and spring. 4-6 in.



Viola williamsii (*Viola of gardens*). Hardy perennial, variously coloured flowers, summer. 6 in.



Viola wittrockiana (Pansy). Annual or short-lived perennial with variously coloured flowers. 6 in.



Viscum album (Mistletoe). Hardy evergreen parasite, white berries, winter.



Vitis thunbergii. Ornamental-leaved climbing vine, fruits black, richly coloured autumn leaves.



Vriesia splendens major. Stove epiphytic perennial, ornamental leaves, yellowish-white flowers. 4 ft.



Wahlenbergia hederacea (*Creeping Harebell*). Hardy rock plant, blue flowers, summer, trailing.



Waldsteinia siberica. Hardy rock plant, yellow flowers, summer. 3-4 in.



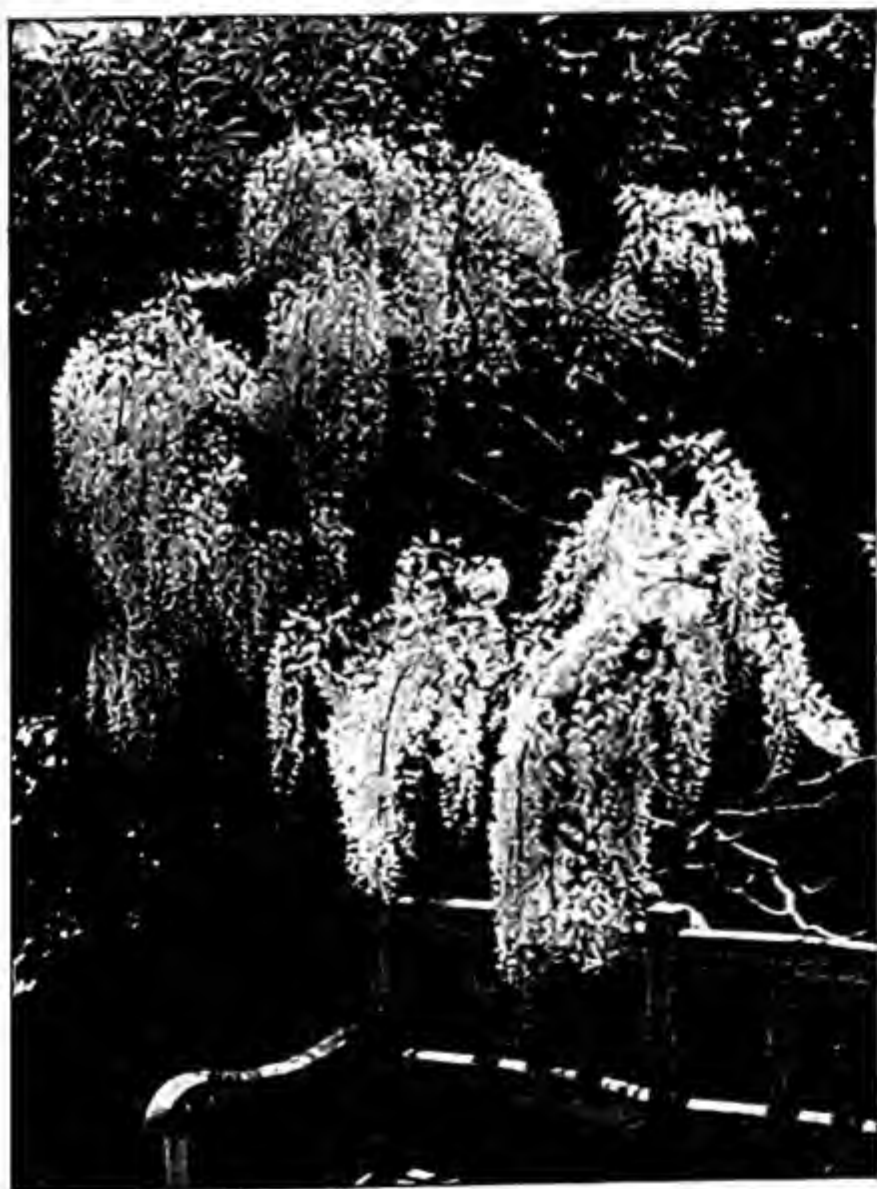
Watsonia meriana. Half-hardy bulb, pink flowers, summer. 4 ft.



Weigela florida. Hardy shrub, rose-pink flowers, May. 6-8 ft.



Welwitschia bainesii. Stove foliage plant of difficult culture, leathery leaves with curling thongs. 1 ft.



Wisteria floribunda. Hardy shrub, lavender blue flowers, May and June. 30 ft.



Woodsia alpina. Hardy tufted fern, feathery fronds. 6 in.



Wulfenia amherstiana. Hardy perennial, light blue flowers, June and July. 9-12 in.



Xanthoceras sorbifolium. Hardy tree, white crimson-stained flowers, May. 10-20 ft.



Xanthoceras sorbifolium. Hardy tree, green pear-shaped fruits, brown seeds.



Xeranthemum annuum. Hardy annual, white or purple flowers, summer. 2 ft.



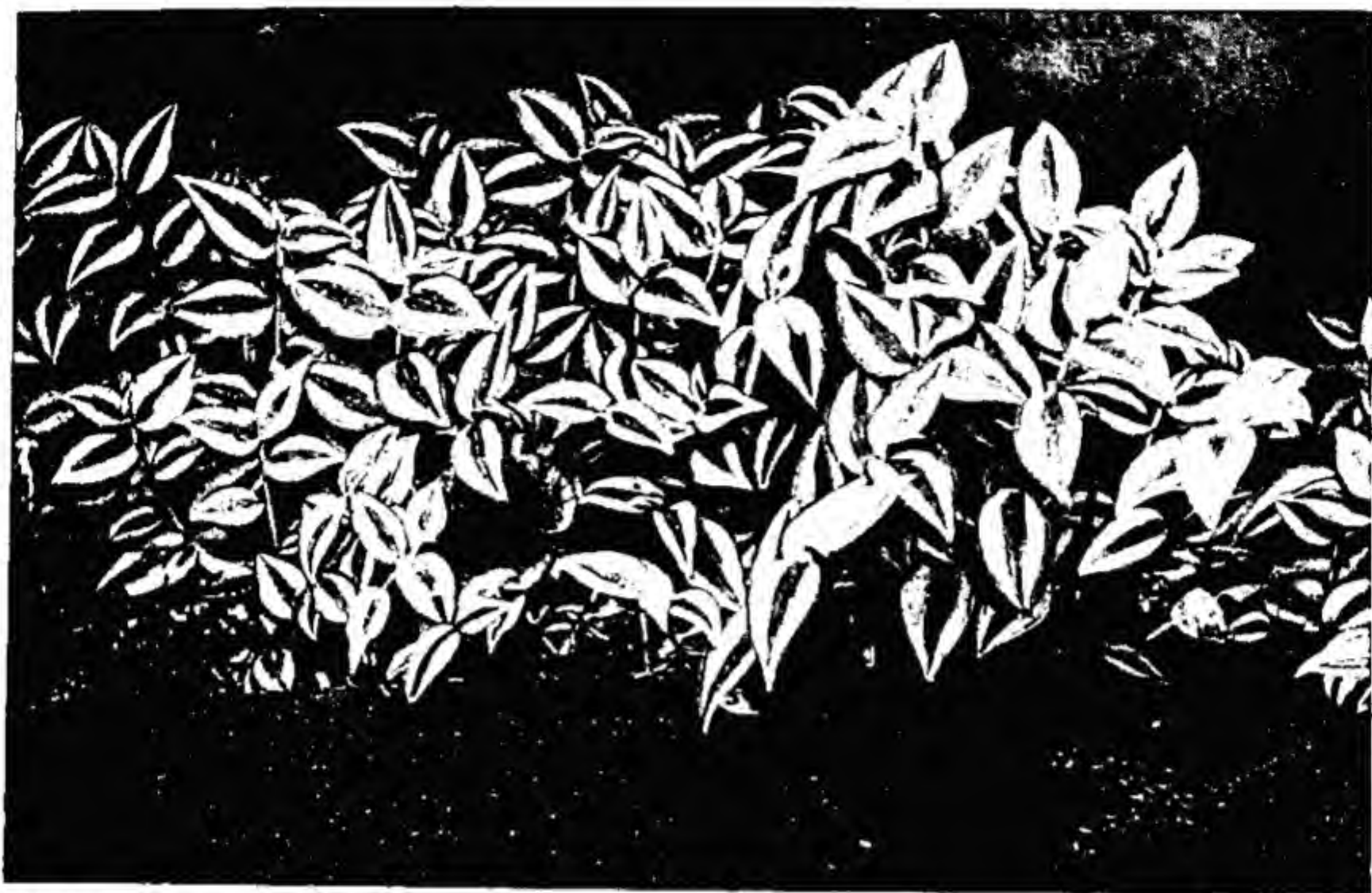
Yucca filamentosa (Adam's Needle). Hardy shrub, creamy flowers, July. 6-9 ft.



Zantedeschia aethiopica (Calla Lily). Greenhouse perennial, white flowers, winter and spring.



Zauschneria californica. Half-hardy shrub, scarlet flowers, autumn. 1 ft.



Zebrina pendula (Wandering Jew). Greenhouse trailing perennial, ornamental leaves, striped white above, purple below.



Zenobia pulverulenta. Slightly tender, nearly evergreen shrub, white flowers, summer. 4-6 ft.



Zephyranthes candida. Hardy bulb, white flowers, September. 6-12 in.



Zinnia elegans. Hardy annual, variously coloured flowers, summer. 2-3 ft.



Zygopetalum mackayi. Epiphytic orchid, yellowish-green and purple flowers, autumn and winter.



Zygocactus truncatus (Christmas Cactus). Succulent greenhouse or room plant, rosy-red flowers, winter. 9-12 in.

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THE ENCYCLOPAEDIA
OF GARDEN WORK AND TERMS

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OF GARDEN WORK
AND TERMS

BY
A. G. L. HELLYER
F.L.S., Editor of 'Amateur Gardening'

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UNIFORM WITH THIS BOOK

Sanders' Encyclopaedia of Gardening
The Encyclopaedia of Plant Portraits
The Encyclopaedia of Garden Pests and Diseases

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FOREWORD

FOR many years I have been an admirer and user of Sanders' *Encyclopaedia of Gardening*, which I regard as quite the best single volume work of its kind for the gardener. It is extremely comprehensive, very accurate and unusually complete in its cultural instructions.

But just because such a vast amount of information was compressed into one book of modest size it was necessary to leave something out—and that something was the explanation of how various tasks in the garden are done. Sanders' *Encyclopaedia* tells you exactly how you must grow every kind of plant you are ever likely to hear about in English gardens; it tells you when to pot or plant it, what sort of soil to grow it in, how to water and prune it, and by what means to increase it. But it assumes that you know the way to pot, to plant, to water, to prune and sow seeds, take cuttings, peg down layers, graft, etc.

Now, obviously, not every gardener does know all there is to know about every one of these tasks, let alone the hundreds of other cultural operations that may have to be mastered at some stage. Nor does everyone know all about fertilizers, insecticides, fungicides, growth regulating hormones and the multitudinous other chemicals that a twentieth-century gardener may have to use.

It seemed to me, therefore, that there was room for a companion volume to Sanders' *Encyclopaedia of Gardening*; a volume that would supply all this kind of technical information about the craft of gardening, and that would, at the same time, serve as a glossary for the technical language that inevitably grows up around any specialized subject. For such jargon usually provides the shorthand of communication, without which any exchange of ideas becomes laborious in the extreme. As an example, it is much simpler to speak of the 'second crown bud' of a chrysanthemum than it is to explain every time just which bud one means by that term.

And so in this *Encyclopaedia of Garden Work and Terms* I have attempted to provide the reader with all this information so that, if used with Sanders' *Encyclopaedia of Gardening*, it will provide a complete work of reference for any problem that is likely to arise in the garden. I realize that this is rather an ambitious claim, and that no book on any subject ever really says the last word or answers every question that may be asked. But I do hope that I have given enough information on a sufficiently wide

range of subjects to meet most ordinary requirements in the garden, and that, in consequence, this book will not only be useful in its own right, but that it will still further widen the popularity and usefulness of Sanders' *Encyclopaedia of Gardening*.

ROWFANT, 1953

A. G. L. HELLYER

ENCYCLOPAEDIA

ABORTIVE Barren; imperfectly developed or not developed at all.

ACARICIDE Any chemical which will kill mites. The term is often used in describing sprays or dusts produced for the purpose of killing red spider mites.

ABSCISSION LAYER A layer of thin-walled cells formed between leaf-stalks and stems and also between fruit stalks and stems before the leaves or fruits fall. It is at this layer that the break occurs. On the stem side of the abscission layer another corky layer is formed to seal the wound.

ACAULESCENT A botanical term meaning stemless or practically stemless. The specific epithets *acaulis* and *acaule* are derived from the same root and are often applied to plants the flowers of which are either stemless or carried on extremely short stems.

ACHENE A botanical term for a seed vessel or fruit that is dry. It contains only one seed and does not split open along a clearly defined line or lines. The fruit of a buttercup is of this type.

ACICULAR A botanical term usually applied to leaves and meaning needle-shaped.

ACID Chemically an acid is a substance which will turn blue litmus dye pink in contrast to a 'base' or alkali which turns pink litmus dye blue. As far as the gardener is concerned he can think of acid substances most helpfully as those which are sharp and sour and have the property of combining with alkalis to form salts which are in the main neutral in reaction, i.e. neither acid nor alkaline.

The term is important to gardeners because soils are either acid, neutral or alkaline and this may have an important bearing on their fertility, the kinds of plants which they will grow and even the susceptibility which these plants may show to certain diseases. For example, most members of the heather family (*Ericaceae*), which includes heathers, rhododendrons, pieris and andromeda, will only thrive in soils which are to some extent acid. By contrast, most members of the brassica family, which includes cabbages, brussels sprouts and kale, succeed best in soils which are neutral or slightly alkaline; if planted in markedly acid soils they are often heavily infected with club root disease.



Acicular leaves

Acidity and alkalinity can be measured by various means, but are usually expressed in terms of a scale which is known as the pH of the substance tested. If the substance is described as being pH 7.0 it is neutral, that is to say, neither acid nor alkaline. If it is described as having a pH above 7.0 (for example pH 7.5) it is alkaline, whereas if the figure is below 7.0 (for example pH 6.5) the substance is acid. In general the most satisfactory reaction for a garden soil in which many different plants are to be grown, is between pH 6.5 and pH 7.0. Soils with readings below 6.0 become difficult for many plants except those that thrive in acid conditions. Similarly, above pH 8.0 trouble may be experienced with many plants and there may be signs of severe mineral deficiency (a form of starvation in fact), owing to the locking-up of certain essential foods in the soil.

Any soil that is being cultivated extensively, will tend to become more acid in time and this increasing acidity will be most rapid when heavy applications of dung or compost are made. It is part of the gardener's task to assess from time to time the acid-alkaline reaction of his soil and maintain it at the level most suitable for the particular plants he proposes to cultivate. The test can be carried out in several ways, most simply, and for most purposes sufficiently accurately by the barium sulphate colour test, but still more accurately by an electrical apparatus. Reagents for the barium sulphate test, with a suitable colour-chart, can be purchased from chemists who specialize in horticultural sundries.

In the British Isles, the degree of acidity of most soils is controlled by the amount of lime they contain. A soil containing free lime will always be to some degree alkaline and therefore unsuitable for the really acid-loving plants. It is however, possible for lime to be present in the soil without being free: this so-called 'active' lime (i.e. lime that has become combined with humus and the finest soil particles or 'colloids') is a vital constituent of all fertile soils. The less active lime there is, the more acid the soil will be usually; harmful acidity can, in consequence, always be

remedied by giving dressings of lime (see *Lime*, page 145). Acidity may be caused by an excess of organic matter in the soil and also by poor aeration (see *Aeration*, page 9). In consequence, besides treatment with lime as above, cultivation, which improves both aeration and drainage must be considered as possible methods of counter-acting acidity.

Acids also interest the gardener in another connexion, for they can sometimes be used effectively as weed killers. For this purpose sulphuric acid has proved most effective. Very dilute sulphuric acid, 1-2 pints in 3 gallons of water, is used as a spray at the rate of 5 pints per rod to destroy annual weeds on vacant ground. It can also be used to kill weeds among seedling onions, as at this stage the onions are not harmed by the spray but the weeds are killed. It is important to note that in diluting sulphuric acid, the acid must be added to the water and not the other way round, and that special acid-resistant spraying apparatus should be used, as ordinary metal will be eaten away by the acid. This spray is also sometimes used to kill potato haulm that is infected with potato blight disease, and so prevent the infection spreading to the tubers.

One effect of an acid soil which gardeners often turn to account is that coloured hydrangeas produce blue flowers when grown in them, whereas in alkaline soils the flowers are pink. (White hydrangeas remain white no matter what the pH of the soil.) In consequence, if the gardener wishes to have blue flowers he must take care to see that the soil is suitably acid. If it is naturally acid he need do nothing, but if it is neutral or alkaline he may give it fairly heavy dressings of either sulphate of aluminium, alum or sulphate of iron, or he may add heavy dressings of acid organic matter such as sphagnum peat, oak leaf-mould or the residue of an old mushroom or cucumber bed. Various chemical recipes have been suggested, one of the most reliable being to prepare a compost of 3 parts by bulk of old cucumber loam and 1 part oak leaf-mould and to add to each cwt. of the mixture $2\frac{1}{2}$ lb. of sulphate of aluminium.

ACORN The fruit of the oak.

ACRE An area of 4840 square yards.

ACUMINATE A botanical term usually applied to leaves, indicating that they taper to a rather long and narrow point and that the sides of this point are themselves curved inwards.

ACUTE A botanical term often applied to leaves, indicating termination in a sharp point. The term differs from acuminate in that in this instance the sides of the point are either straight or curved slightly outwards.

ADRESSED, see *Appressed*.

ADVENTITIOUS A botanical term for a growth or organ produced by a plant at a place which would not normally have a growth or organ of that type. For example, if a young willow is cut off and inserted in the soil in autumn or winter, it will almost certainly produce roots from the base, and these are known as adventitious roots because they would not have been produced had the branch been left to grow on the tree. In the same way, if a tree is cut down, buds and, later, shoots may be produced near the top of the stump, despite the fact that there were no buds there previously. These are known as adventitious buds. It is sometimes possible to produce adventitious growth by chemical means. For example, if one of the root-forming hormones is smeared or painted on the shoot of a growing plant, it is possible that a few weeks later roots will appear at this point despite the fact that the shoots may be nowhere near the soil and the roots are quite useless to the plant.

AERATION Applied to gardening this means the presence, so important in all fertile soils, of air spaces between their particles. Many cultural operations are concerned with the improvement or maintenance of satisfactory aeration. For example, a lawn which has been subject to heavy wear will become so consolidated that little or no air can penetrate the soil. To remedy

this the gardener perforates it with a spiked roller or even with the prongs of an ordinary garden fork, so letting in air and restoring the fertility of the soil.

Coarse sand is a usual ingredient of most seed and potting composts because it prevents the more adhesive constituents of the mixture from binding too closely together and so excluding air. Digging, forking and hoeing, though necessary for other reasons are also valuable because they increase aeration. In a soil which contains insufficient air, harmful bacteria and other micro-organisms thrive and acid conditions are rapidly produced.

AERIAL ROOT Any root which appears above ground level is known by this name. Aerial roots are most important to certain orchids which in nature live on trees where there is little or no soil. In consequence they obtain most of their nourishment from the moisture in the air which they absorb by means of these aerial roots, as well as by their leaves. Some climbing plants cling by means of aerial roots, e.g. ivy.



Aerial roots of ivy

AEROBIC A term used to describe bacteria which require air, in contrast to those that can live without it and are therefore described as anaerobic. In general anaerobic bacteria are harmful from the garden standpoint whereas many aerobic bacteria perform useful functions such as releasing the plant food stored in organic matter. Part of the benefit gained by soil cultivation is due to the fact that it permits air to penetrate more freely and so stimulates aerobic and discourages anaerobic bacteria.

AEROSOL A colloidal suspension of any substance in air. Aerosols of various chemicals are sometimes used in greenhouses to destroy pests but the method has been superseded to a considerable extent by smokes carrying the same or similar chemicals. A method commonly employed to produce an aerosol is to prepare a solution of the chemical in a volatile fluid, place this in a closed metal chamber and drive it out with great force through a fine jet by discharging a 'Sparklet' bulb of compressed carbon dioxide into the chamber. As a result very fine particles of the chemical are left suspended in the air and eventually become deposited as a fine film on all exposed surfaces such as the leaves and stems of plants or the bodies of insects. Azobenzene is often used as an aerosol to destroy red spider.

AGGREGATE The hard material used to form the bulk of concrete or to act as the rooting medium in soilless cultivation. Gravel and sand are the materials most commonly employed, but broken clinkers are sometimes used.

AIR LAYERING A method of rooting branches of shrubs by wounding them, encasing the wound in damp sphagnum moss, and covering this with a sleeve of thin polythene. (See *Layering*.)

ALBINO This term is more commonly applied to animals than to plants and signifies an individual in which the normal colouring matter is absent, but occasionally white forms of normally coloured flowers are known as albinos.

ALDRIN An insecticide chiefly used for killing soil pests such as wireworms, millipedes, leatherjackets and cutworms. It may be applied as a dust to be raked or forked in, or can be purchased in combination with chemical fertilizers for application in the usual way.

ALGAE Very simple plants which include those that form a green film on damp surfaces of stone and wood and the thread-like green growths found in ponds. Seaweeds are

also algae. In the main they are not harmful from the garden standpoint but excess of algal growth in ponds can be a nuisance. The pond growth popularly known as flannel weed is an alga. It can be killed with copper sulphate used at the rate of 23 grains per thousand gallons of water but this remedy must be used with great caution as an excess will kill ornamental aquatics and fish. The correct quantity of copper sulphate required to treat the pond should be placed in a muslin bag tied to a string, and should then be dragged through the water until dissolved. Copper wires stretched just below the surface of the water will help to control algae.

ALGINATE, see *Soil Conditioner*.

ALKALINE The opposite of acid; a substance which turns pink litmus paper blue. See *Acid*.

ALLOTMENT Any plot of land not exceeding 40 rods, and rented for the purpose of growing crops for home consumption. Most allotments in England are about 10 rods in extent. Usually the plot is rectangular, 30 feet in width and 90 feet in length. The Allotments Act of 1950 governs such matters as tenure and compensation.

ALLUVIAL Strictly speaking the term means 'that which has been washed'. It is important to gardeners because certain types of soils are geologically known as alluvial. These are all soils which have been deposited by rivers and are composed very largely of silt. Large areas in Lincolnshire and Norfolk are composed of soil of this character, and are important as market-gardening, potato growing, and bulb-growing districts, because of the extremely workable and fertile nature of the soil.

ALPINE Strictly speaking an alpine is a plant which grows naturally on mountains. In gardens the term has come to be applied to almost any plant suitable for cultivation in rock gardens, in fact it is to all intents and purposes synonymous with 'rock plant'. Genuine mountain plants are for the most part dwarf and compact in habit and they

thrive best where light is good and drainage quick. Many of them are adapted to finding their living in very stony places, and they have long roots capable of penetrating a great distance in search of food and moisture. Often they have to be dormant for many months under a deep protective covering of snow and then crowd the whole of their growth, including the production of flowers and the ripening of seeds, into three or four months during which they have the benefit of the clear mountain atmosphere and an abundant water supply from snow melting on the higher slopes. These plants are not always easy to grow under our lowland conditions with our ever-changing weather, lack of sunshine and the absence of protective winter snow.

ALTERNATE A term applied to leaves which are placed singly on the stem at different heights in contrast to leaves which are in pairs opposite one another or in whorls, several together.

ALUM This aluminium salt is sometimes used in gardens as a slug killer or as a bird

deterrent, and is also employed to increase the acidity of soil. For the first two purposes 4 ounces of powdered alum are dissolved in 1 gallon of water. This solution, if watered on vacant ground or on greenhouse staging and floors, will kill any slugs with which it comes in contact. The same solution sprayed on to buds of fruit trees or ornamental plants will make them so bitter that as a rule birds will not touch them. Dry alum can also be sprinkled in a narrow ring round any plant likely to be attacked by slugs. To increase the acidity of soil, alum is raked or forked in at rates of up to 1 lb. per square yard or may be mixed with potting soil at the rate of $2\frac{1}{2}$ lb. per cwt. of soil.

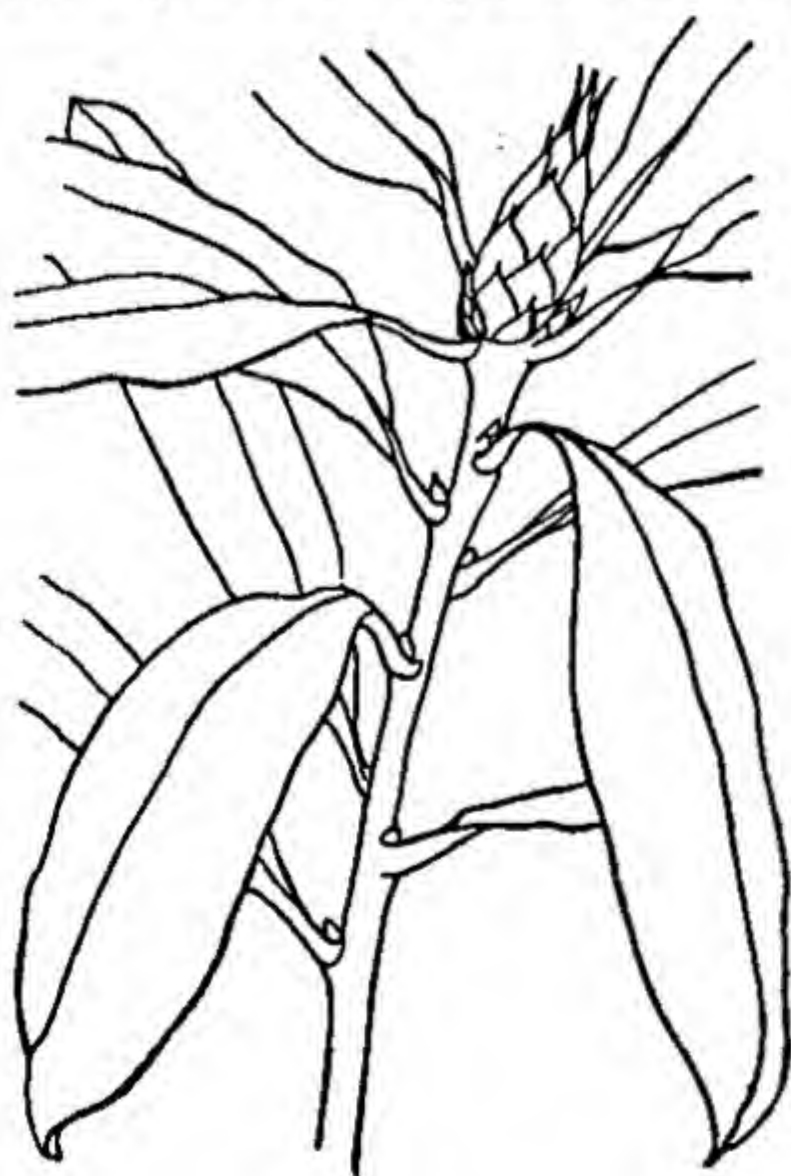
It is the substance chiefly used to promote the production of blue flowers in hydrangeas. See *Acid*.

AMERICAN BLIGHT A name frequently given to a pest of apples, also known as *woolly aphis*. It is described under that name.

AMERICAN GOOSEBERRY MILDEW, see *Gooseberry Mildew*.

AMMONIA Pure ammonia is a gas which very readily unites with water to form the familiar 'liquid ammonia' (really ammonium hydroxide) of the kitchen. This powerful and volatile alkali is seldom used directly in the garden, despite the fact that it is a potential source of nitrogen which itself is an important plant food. The trouble is that ammonia is an inconvenient substance to use as a fertilizer because of its scorching effect on plants and its volatility. Ammonia can, however, be applied to the soil in the form of various salts the most popular of which is sulphate of ammonia (*q.v.*) (chemically ammonium sulphate). Kitchen ammonia may also be added with advantage to water that is to be used to wash greenhouse glass as it has marked cleaning properties. Incidentally ammonia is often given off by decomposing dung and can be smelt strongly. This shows bad storage, as all ammonia lost in this way represents a loss of nitrogen.

AMMONIUM POLYSULPHIDE A fungicide which was at one time popular



Alternate leaves

but has now been largely replaced by other chemicals. However, it is still sometimes used as a remedy for American Gooseberry Mildew for which purpose it has the advantage that, unlike some other sprays, it does not mark the fruits.

It must be purchased in the form of a concentrated solution which will be described on the container either as APS 1918 or APS 1919. The latter solution is exactly twice the strength of the former, therefore only half the quantity is required. The formula is as follows:

$\frac{1}{2}$ pint concentrated APS 1918 (or $\frac{1}{4}$ pint concentrated APS 1919)

5 gallons of water.

$\frac{1}{2}$ lb. soft soap (or any proprietary spreading agent used according to manufacturer's instructions).

Dissolve the soft soap in a little boiling water, make up to 5 gallons, then add ammonium polysulphide, stir well and use at once. This spray should not be prepared in copper or brass vessels. For American Gooseberry Mildew, two applications should be given—one in spring as soon as the flowers are set and the other three weeks later.

ANA An abbreviation sometimes used for alpha-naphthalene-acetic acid. See *Hormones*.

ANBURY A name sometimes used for a disease of brassicas usually known as *club root*. It is described under that name.

ANNUAL A plant that completes its cycle of life within a year, germinating, flowering, setting seed and then dying. It should be understood that this cycle need not necessarily be within any one calendar year, e.g. it is quite possible to sow many annuals in September and over-winter them so that they flower the following spring or early summer and then set their seed and die. Nor need the annual take anything like a year in completing its life cycle. Many annual weeds such as groundsel and chickweed, complete the cycle so quickly that they are quite capable of producing several generations in a year, and are termed ephemeral.

The annual may be contrasted with the perennial, which lives for an indefinite number of years and may flower and seed many times, and also with the monocarpic plant, which, like the perennial, lives for an indefinite number of years but only flowers once, thereafter setting seed and dying.

No completely satisfactory scientific explanation of the annual's behaviour has yet been made, although it has been suggested that death after seed production may be due to an accumulation of poisonous substances within the plant, a suggestion which seems to imply that if some method could be discovered of dispersing these poisons, the annual would behave like a perennial.

From the gardener's point of view, annuals are subdivided into three groups—hardy, half-hardy and tender. Members of the first group can be grown out of doors at any time of the year without protection, e.g. clarkia, godetia, calendula and cornflower. Members of the second group can only be grown out of doors in the warm weather and must usually be started under glass, though occasionally this aid can be dispensed with, e.g. ten-week stocks, annual asters, French and African marigolds and zinnias. Tender annuals require greenhouse cultivation most if not all of the time and are in general unsuitable for growing out of doors, e.g. celosia, *Torenia Fournieri* and its varieties.

Hardy annuals can, in general, be sown where they are to flower and be thinned out in the seedling stage, thereafter being left to grow on undisturbed. Alternatively some varieties may be raised in a nursery bed and transplanted to their flowering quarters when large enough. The best sowing times are usually March to May and again in early September. Most varieties thrive in good ordinary soil and do not require any special care.

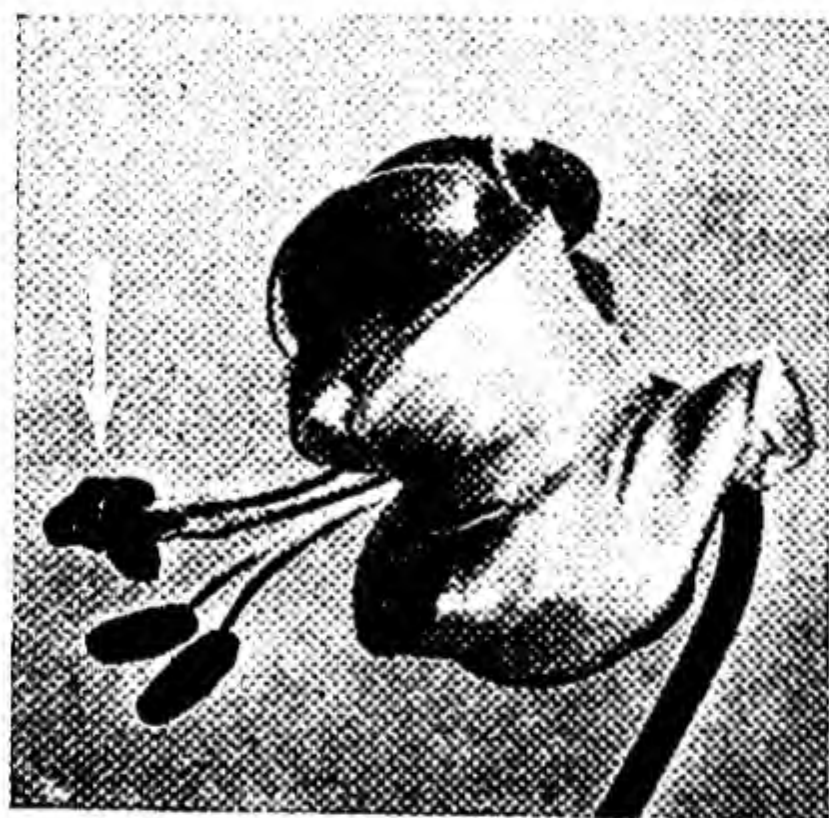
Half-hardy annuals are, in general, raised in a greenhouse or frame in a temperature of 60-65 degrees. They may then be pricked off into pans or boxes and hardened off for planting out when the weather is sufficiently mild, usually towards the end of May or early in June. Sowing time may be anything from early January to late March. In favourable

places some half-hardy annuals may be sown outdoors in late April or early May and left to mature where they germinate.

Tender annuals must always be germinated in the greenhouse in a temperature of 60 degrees or more and sowing time will depend upon the season at which flowers are required.

ANTERIOR A botanical term meaning 'front' or 'on the front'. Thus the anterior lobe of a flower is the front lobe.

ANTHER That part of the flower which produces pollen, the male sex cells of the plant. The anther itself forms part of the stamen the remainder of which usually consists of the filament, a thread-like stem which bears the anther. In some flowers



Anthers

anthers are of considerable size and add greatly to the decorative properties of the bloom, e.g. the central cluster of golden anthers in a single rose, the large yellow anthers in a white lily or the nearly black anthers in some tulips.

Plant breeders often remove the immature anthers from flowers which have been selected as seed parents. This is done in order to prevent fertilization with their own pollen and the process of removal is known as emasculation.

ANTHOCYANINS A class of pigments found in plants and dissolved in the sap. They may be contrasted with flavones which are pigments occurring as minute particles or plastids in the sap. The anthocyanin colours range from blue to red.

ANTHRACNOSE A disease that is fairly common in french and haricot beans and is occasionally found in runner beans. It is caused by a fungus which attacks pods, leaves and stems, causing dark, wrinkled or cratered spots to appear on the first two and black, cankered areas on the stems. Seeds, too, may show dark patches caused by the fungus. Such seeds should not be sown. If the disease has been troublesome in former years, all plants should be sprayed with half-strength Bordeaux mixture once or twice before flowering. After flowering they may be sprayed with lime sulphur, 1 fluid ounce to 4 gallons of water, every fortnight or three weeks until the pods are half grown.

ANTS These are enemies to the gardener for two reasons; they loosen the soil and so disturb the roots of plants, and particularly of seedlings, and they transport aphides from one plant to another. They do not themselves attack plants directly. Ants can be destroyed by dusting the soil around their nests with DDT. Several proprietary ant-killing preparations are also offered and these should be used according to manufacturer's instructions. Another effective method of killing ants is to bore a hole with a stick into the nest, pour in $\frac{1}{4}$ fluid ounce of carbon disulphide and seal the hole at once with soil to trap the fumes.

APETALOUS A term applied to flowers which have no petals.

APICAL At the summit or tip of a branch or any other organ.

APICULATE Coming to a small but sharp point. A term often applied to leaves.

APHIS The scientific name for the many louse-like plant pests which are known in gardens by such popular names as greenfly,



A bad infestation of aphids. Note the curling of the leaves

black fly, American blight, dolphin fly and blue fly. Though they differ considerably in appearance and in the plants which they attack, all the numerous species have this in common, that they obtain their food by sucking the juices of plants. As a result of their attack plants are weakened and shoots or leaves frequently become curled or otherwise distorted. More serious still, aphides frequently act as carriers of virus diseases, picking up the virus from infected plants and inoculating previously healthy ones with it.

Aphides are capable of breeding at a tremendous rate under favourable conditions. A change in the weather will often bring an attack to a sudden end but the gardener who relies upon this would be asking for trouble. Some of the 'flies' are winged and can travel considerable distances but the majority are wingless and their powers of locomotion are small. A crop planted 100 yards or so away from another of the same kind may remain quite clean though its neighbour is heavily infested with aphids. Most aphides prefer the young shoots and leaves and will be found clustered around the tips of the former and on the lower surfaces of the latter.

The substances most effective in killing aphides are nicotine, HETP and derris.

These insecticides should be used immediately aphides are seen and be applied directly to the insects in the form of a wetting spray. Nicotine and derris may also be applied as dusts but these are as a rule less effective. In any case it is desirable to repeat the application two or three times at intervals of about a week as some of the aphides are capable of giving birth to live young even after they have themselves been killed and in this way a secondary infestation may occur.

Before the beginning of winter, eggs are laid and these remain throughout the winter and so provide a means of reinfestation the following spring. On fruit trees the eggs can often be seen quite clearly and in great numbers on the ends of the shoots. They are very small and dark coloured. It is partly to destroy these aphids eggs that fruit trees are sprayed in winter with tar oil wash or DNC winter wash.

APPLE BLOSSOM WEEVIL, see *Weevils*.

APPLE MILDEW, see *Mildew*.

APPLE SCAB, see *Scab*.

APPLE SAWFLY, see *Sawfly*.

APPLE SUCKER, see *Sucker, Apple*.

APPRESSED A botanical term meaning closely pressed together and often applied to leaves which are closely pressed to the stem. Adpressed has the same meaning.

AQUATIC Broadly speaking any plant which lives either wholly or partly in water, though it is more exact to say that the aquatic lives entirely in water and to reserve the term subaquatic for the marginal plants which are occasionally under water but more often above it. Aquatics are of many different and quite unrelated genera. Because of this there is very little that can be said in a general way about their cultivation, which will differ according to the particular variety under consideration. As a rule the best planting season for aquatics is from April to June and it is seldom wise to disturb them during the autumn or

winter when they are at rest. Some of the large water-lilies thrive in water as much as 3 feet deep and will cover considerable areas, whereas others such as the flowering rush (*butomus*) and the Arrow Head (*sagittaria*) would be killed by water more than a few inches deep. There are hardy aquatics which can be grown in the open air throughout the year, e.g. many of the popular water-lilies such as *Nymphaea Laydeckeri* and *Nymphaea Gladstoniana*; others which are half-hardy and require greenhouse protection in winter, e.g. *Calla palustris*, and yet others that are tender and require greenhouse protection throughout the year, e.g. the Water Hyacinth, *Eichhornia crassipes*.

One particular group of aquatics grows completely submerged in the water, e.g. *vallisneria*, *elodea* and *myriophyllum*, and many of these have the valuable property of giving oxygen to the water and so keeping it fresh. Such varieties are known as oxygenating plants.

ARACHNOID A botanical term meaning 'like a cobweb'. The specific epithet *arachnoideus* is derived from the same root. Thus *Sempervivum arachnoideum* is a houseleek in which the rosettes of leaves are densely covered with fine white filaments like cobwebs.



Arachnoid

ARBORETUM A garden or park devoted exclusively or mainly to the cultivation of trees and shrubs, though in practice the term is usually confined to collections of botanical interest.

ARCHANGEL MATS These are made in Russia from woven strips of fibre or the

inner bark of a lime tree. The mats were at one time freely imported to Britain from Archangel, hence the name Archangel mats. They were much used in gardens for covering frames or tender plants in winter. Nowadays they are seldom seen and their place has been taken by hessian and other substances.

ARCURE A system of training fruit trees. Branches are bent in the form of horizontal bows so that the upward flow of sap is checked. This is said to promote fruitfulness.

ARMED In botany this term is applied to any plant having spines, thorns or prickles.

AROID Any plant belonging to the botanical family *Araceae*. This includes the arum lilies, anthurium, philodendron and monstera.

ARSENATE OF LEAD, see *Lead Arsenate*.

ARTICULATE Jointed: a botanical term used to describe any part of a plant which has nodes or joints, or at which separation from the parent plant may be expected to occur naturally.

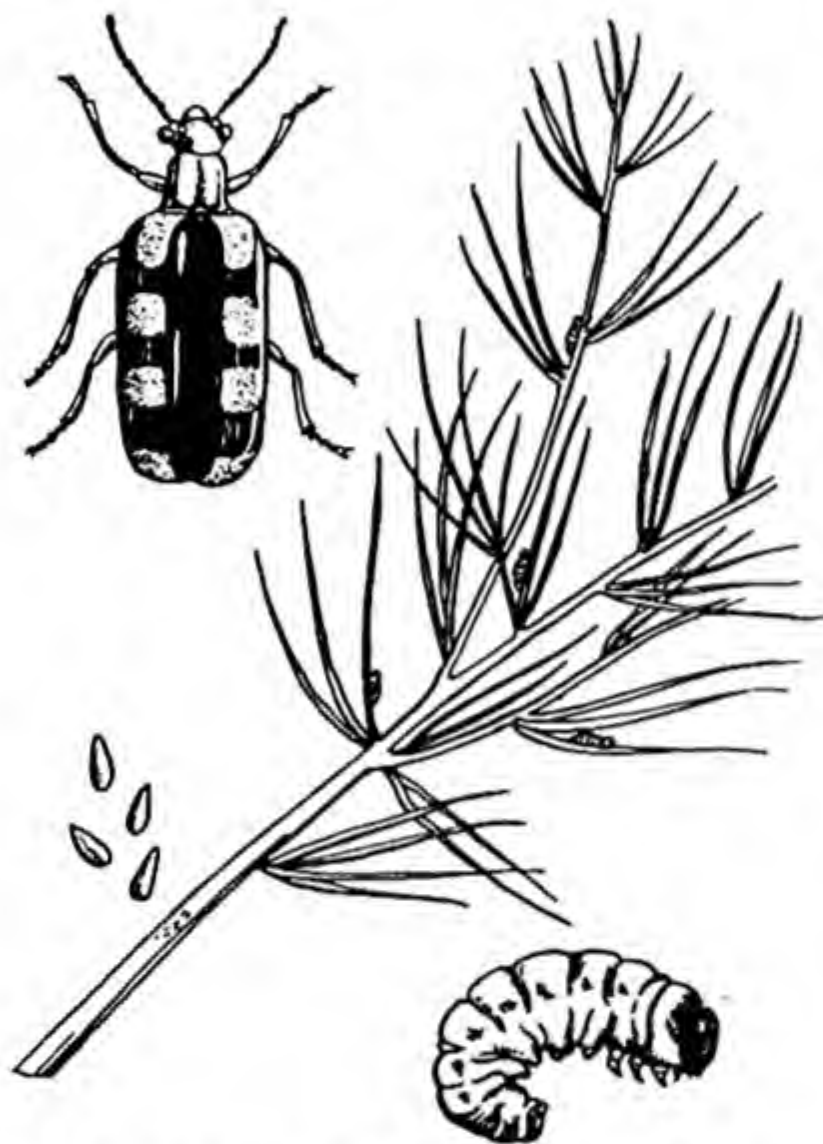
ASCENDING A term applied to stems which are neither prostrate nor erect but curve upwards, or are produced obliquely.

ASEXUAL Literally sexless. In gardening chiefly used for methods of propagation not involving seed, e.g. division, cuttings, layers, runners, grafts and buds. See also *Vegetation Propagation*.

ASHES Wood ashes, if they have not been long exposed to rain, are useful as a fertilizer as they contain carbonate of potash. Soft coal ashes are of little value in the garden but ashes from hard coal or coke, if coarse and gritty, may be used to lighten heavy soil. They contain little if any plant food. Ashes make a useful medium in which to plunge flower pots to prevent excessive evaporation or rapid changes in temperature. See *Potash* and *Plunge Bed*.

ASPARAGUS BEETLE The adult beetle is small but rather handsome—jet black with several orange markings. The green-

ish-grey grub or larva feeds on the foliage of asparagus often eating the stems quite bare. The remedy is to spray the foliage at the first sign of trouble, with derris, DDT or arsenate of lead.



The life-history of the Asparagus beetle

ASTER WILT A common fungus disease of annual asters (*callostephus*) which attacks the main stem near soil level causing it to turn black and die. As a result the whole plant wilts and collapses. The disease is soil-borne and for that reason difficult to control. Seed of annual asters should be sown in sterilized soil and this should also be used for the seedlings when they are pricked out. Plants should not be put out in ground on which wilt has occurred. Wilt resistant varieties of *callostephus* are available.

ATTENUATE Tapering narrowly or drawn upwards. Thus an attenuated shoot is one that has grown taller yet thinner than normal.

AURICULATE Provided with ear-like attachments. The term 'auricle' is the noun

from the same root. Auricles or ear-like portions are characteristic of the leaves or flowers of some plants.

AWL-SHAPED Tapering to a fine or needle-like point. The term is often applied to leaves.

AWN Any thread-like attachment to a fruit or seed, though the term is most commonly applied to the 'beard' of some grasses and cereals.

AXIL The angle between a leaf stalk or leaf and the stem on which it grows. At this point there is usually a bud, either a growth bud or a flower bud and this may be referred to as the axillary bud. It is buds of this character that are used in the particular form of grafting known as 'budding'.

AZOBENZENE A chemical which can be used in the form of aerosols or smokes for the destruction of red spiders under glass. The aerosol is produced by discharging a bulb charged with carbon dioxide into a container holding a measured quantity of azobenzene. As a result the liquid is forced through a small jet and is further broken up by the 'boiling' action of the carbon dioxide dissolved in it. An extremely fine mist is produced which penetrates to all parts of the house. The smokes also carry the azobenzene far and wide, depositing it as a very fine film on the surface of the leaves and stems. These preparations must be used according to manufacturer's instructions. They are most effective and least liable to cause foliage injury if the temperature of the greenhouse is at or above 75 degrees Fahrenheit. They are liable to damage *schizanthus*, sweet peas and zinnias.

BACTERIA These are very simple forms of life each individual consisting of no more than one cell. Ordinary fertile soil teems with bacteria of many different kinds and so minute are they and so prolific that they may number millions in a few grammes of soil. Some bacteria may be harmful to plants, but many are indirectly beneficial because they assist in the decay of organic matter in the soil, in the release of chemical plant foods and, in some cases, in the actual

fixing of nitrogen (itself one of the most important plant foods) from the atmosphere.

Broadly speaking bacteria may be grouped, from the point of view of horticulture, under two headings—those which require a fair amount of air if they are to survive and in consequence are known as aerobic, and those which thrive with little or no air and in consequence are known as anaerobic. The distinction is important, because most of the aerobic bacteria are beneficial or at least not harmful, whereas the majority of the anaerobic kinds have a bad effect on soil or plants. Much soil cultivation is concerned with the improvement of aeration, partially of course for the direct benefit of plant roots which themselves need air but also to encourage the increase of beneficial bacteria and to discourage the harmful kinds.

What is sometimes erroneously known as soil sterilization (erroneously because it is, in fact, only very partial sterilization) is also particularly concerned with the destruction of harmful bacteria and it is perhaps, fortunate for the gardener that in general the more useful kinds of bacteria appear to be more resistant to heat than those which are less desirable; in consequence if soil is not over-sterilized (a temperature of 200 degrees for 20-30 minutes is usually recommended as the optimum) most harmful bacteria are killed and sufficient of the beneficial kinds remain to restock the soil in a matter of a few weeks.

Of the bacteria which fix nitrogen direct from the atmosphere, the most important are *Azotobacter* which exists free in the soil, and the various bacteria which inhabit the nodules found on the roots of most leguminous plants, that is to say, plants belonging to the pea family. These nodules, far from being harmful to the plants, are directly beneficial as they provide an additional source of valuable nitrogen. In some cases great benefit has resulted from the artificial stocking of land with a particular bacterium, as for example in the agricultural cultivation of alfalfa, which requires a nodule-forming bacterium often absent from British soils. This side of bacterial activity has not received much attention in gardens.

Some plant diseases are caused by bacteria. One of the most striking is that popularly known as crown gall. This attacks many different types of plant, always causing large, roughened and tumour-like swellings. The particular bacterium responsible is known as *Bacterium tumefaciens*. The soft rot or heart rot which sometimes causes havoc in crops of celery and cabbages and also in stored carrots, is caused by *Bacterium carotovorum*. No really satisfactory remedy has been discovered for these diseases.

BALL This term is used by the gardener for two quite different purposes—one to describe the ball of soil and roots with which a pot-grown plant can be removed from its receptacle, and the other to describe a peculiar condition of roses, particularly very double forms, which in bad weather fail to open properly but instead decay in the half open bud—a trouble known as balling. Some varieties are very subject to this fault particularly early in the summer or during wet seasons. The remedies are protection from rain and the avoidance of excessive feeding or thinning of the buds, as it is very big buds that are most subject to the fault.

As regards the pot ball, or ball of soil and roots, it is important that this should be obtained intact. It is for this reason that experienced gardeners make a point of cleaning old pots thoroughly. If this precaution is not taken, roots will cling to the dirty wall of the pot and when the plant comes to be removed for repotting or planting the pot ball will be broken and many roots damaged.

BARK BEETLES, see *Shot-hole Borers*.

BARK-BOUND If trees or shrubs grow very slowly, through lack of moisture, lack of plant foods in the soil, injury to the roots or any other cause, the bark tends to become so hard that it is unable to expand in the normal way and actually strangles further development of the trunk or branches. Trees in this condition are described as bark-bound and may continue to make very little growth long after the

removal of the conditions which originally caused them to become bark-bound. Sometimes they will effect their own cure by splitting their bark longitudinally, an occurrence which may cause the gardener great alarm though in fact it is really a good thing. The best remedy for this bark-bound condition is to slit the bark right up the affected trunk or branch with a sharp knife or billhook and thereafter to feed the soil round the tree or shrub generously and keep it well watered in dry weather. The most favourable time to carry out this artificial slitting is in spring, just as growth is commencing. Some gardeners think it necessary to protect the slits against infection with warm grafting wax, Stockholm tar or one of the proprietary wound dressings.

BARK-RINGING, see *Ringling*.

BASAL ROT A name rather loosely applied to several quite distinct diseases which all attack bulbs, causing a decay of the base of the bulb. Roots are destroyed or are very weak and few in number. Narcissi (including daffodils) and tulips are most likely to be affected. In all these the decay is caused by fungal attack but the particular fungus responsible differs according to the precise nature of the basal rot. However, this is a point of academic rather than garden importance as treatment is the same in all cases. All bulbs should be examined carefully before being planted and any that show signs of decay at the base should be burnt. Great care should be taken to avoid

bruising bulbs when they are lifted and stored. The store shed should be cool and dry. It is possible that treatment prior to planting with one of the advertised organo-mercurial fungicides prepared for seed treatment may be of some benefit in preventing the spread of basal rot. If narcissus bulbs have to be given warm-water treatment against eelworm, formalin (40 per cent. formaldehyde) may be added to the bath at the rate of 4 fluid ounces to 5 gallons to kill fungi and spores.

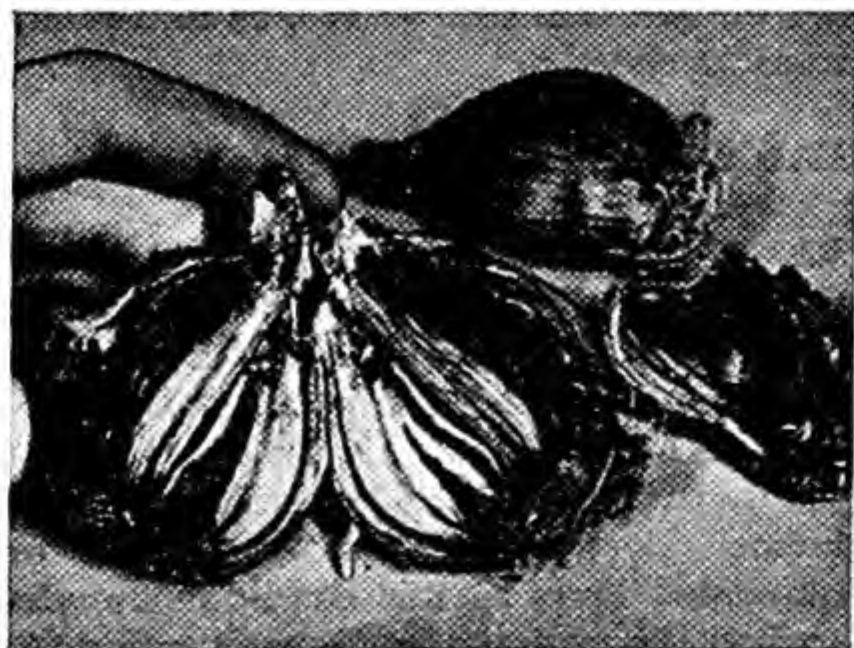
BASIC SLAG A valuable fertilizer which is obtained as a waste material from the lining of blast furnaces. It contains lime and phosphoric acid and therefore has a dual value in the garden. The proportion of these elements varies considerably: poor samples may contain as little as 8 per cent. phosphoric acid, whereas good ones may be as high as 18½ per cent. Moreover the availability of the phosphoric acid also varies and the higher this is, the more valuable the sample as a fertilizer. Availability is estimated on the basis of solubility in citric acid. Good samples may show a solubility of 80 per cent or even more, whereas poor samples may be below 40 per cent. soluble.

Basic slag is a comparatively slow-acting fertilizer, though its rate of action will depend to some extent on the fineness to which it is ground. The finer the powder, the more rapidly will its chemical contents be released. Good samples should pass through a 100-mesh sieve. It is most suitable for autumn and winter application and particularly for the more acid types of soil. Rates may vary from 4 to 8 ounces per square yard.

BASS or BAST A name given to the fibre or inner bark of a lime tree. It is used in the manufacture of Archangel mats (see page 15) and was once employed in the garden as a tying material but is now superseded for this purpose by raffia or soft twine.

BASTARD TRENCHING, see *Digging*.

BEARDED With long hairs, as in the case of the dense growth of hairs which



Basal rot of daffodil bulbs



A bearded iris, arrows indicate beards

occurs on the lower petals or 'falls' of some irises. A 'beard' of this character can often add considerably to the beauty of a flower. The long awns on barley and certain ornamental grasses are also known as the beard (e.g. 'bearded wheat').

BEDDING PLANT A term used by gardeners to describe any plants which are used for temporary display in the garden, which is known as 'bedding out'. Bedding plants may be annuals, biennials or perennials, and can be hardy or half hardy. A typical example is the 'geranium' (*pelargonium*) a half-hardy perennial which is grown in great numbers for planting out in late May or early June and provides a bright display in the garden during the summer months. Bedding plants are usually planted at two main seasons, in early autumn when plants such as wallflowers, forget-me-nots, double daisies, tulips and hyacinths are put in for a spring display, and in late spring, when plants such as geraniums, marguerites, heliotropes, French and African marigolds, stocks and asters are put in for a summer display.

BEEES The common honey bee is usually a friend to the gardener for by carrying pollen from flower to flower it helps to en-

sure fertility in his fruit trees and seed production in a great many other plants. Occasionally this activity may be a nuisance, for example if the gardener is attempting to make particular crosses between one plant and another and requires to be certain that they have not already been fertilized by agencies outside his control. Under such circumstances he will be well advised to protect with muslin, cellophane or paper bags, those flowers which have been selected to produce seed and to do this early before there is any chance of their being ready to receive pollen.

The humble-bee is also a great distributor of pollen and because of its long proboscis is capable of pollinating some flowers which are beyond the powers of the honey bee. Because of its size it can make a mess of delicate flowers and is occasionally a nuisance on this account, particularly to exhibitors.

Another kind of bee is a real pest in the garden because of its habit of cutting pieces out of the leaves of roses, lilacs, privet, rhododendrons, etc. It uses the pieces to build its nest. The pieces are usually bitten out of the edge of the leaf which has a deeply scalloped appearance as a result. The damage is sometimes attributed to slugs but the holes are cleaner and more regular in outline than those made by slugs. Unfortunately there is no very satisfactory remedy though some leaf-cutting bees may be caught with butterfly nets.

The term 'bee' is also applied to the petaloid centre of a delphinium floret.



Carpet bedding

BEET AND MANGOLD FLY The small whitish maggots of this fly tunnel their way through the leaves of beetroot, mangolds and spinach. All affected leaves should be picked off and burned and, when the crop has been harvested, any waste refuse should also be burned. In severe attacks dusting leaves with old soot or spraying with nicotine and soft soap insecticide may be necessary.

BEETLE In general, beetles are friends rather than foes in the garden for many are carnivorous and do not attack plants. In this they differ markedly from weevils, which they closely resemble, though they lack the long snout so characteristic of the weevil. Almost all weevils are garden foes. A few beetles must also be classed as enemies. Principal among these are the asparagus beetle, the flea beetle, the pea and bean beetle, the raspberry beetle and the pollen beetle which are described under their respective names. Beetles can as a rule be destroyed quite easily by spraying or dusting any plants attacked with an insecticide containing either DDT or BHC.

BELL GLASS The true bell glass was developed in France by market gardeners who used it for the intensive cultivation of early crops. It is a large glass jar of bell-shape which can be placed over individual plants or groups of small plants. Nowadays it has been largely superseded by the continuous cloche, but for certain purposes the bell glass is still valuable particularly for the protection of soft and half-ripe cuttings, as it is airtight and can therefore be used to maintain the very close, humid atmosphere which is most favourable to these cuttings.

BENZENE HEXACHLORIDE, see *BHC*.

BERRY Botanically a berry is a fruit in which the seeds are protected only by a fleshy wall formed from the ovary. The term is very loosely applied in gardens to many fruits which are not strictly speaking berries at all. Gooseberries and currants are both true berries in the botanical sense, but raspberries and blackberries are not, as they



Bell glasses

are made up of a number of small 'drupes' i.e. fruits in which the seed is protected by a hard wall or 'stone' as well as by the flesh. Nor are the fruits of cotoneaster and hawthorn really berries as not only are the seeds contained within a hard wall formed from the ovary (the true fruit), but also within a fleshy covering or false fruit formed from the organ known as the receptacle. Curiously enough many true berries in the botanical sense are not recognized as such by the gardener, e.g. tomato, cucumber, melon and orange.

BESOM A broom made of twigs, usually those of a birch tree though occasionally heather is used. At one time the besom was to be found in every gardener's tool shed and it is a pity that it has become less common, as it is still the best type of broom with which to remove dead leaves, worm casts, etc. from lawns.

BHC A synthetic chemical, the full name of which is benzene hexachloride, used as an insecticide. There are several different forms of this chemical and the only one which is effective as an insecticide is the gamma isomer usually known as gamma-BHC. This will kill aphides, weevils, beetles and their larvae, leaf-miners, caterpillars, capsid bugs, scale insects, wireworms, cutworms, leather jackets and many other pests. It can be obtained in various forms

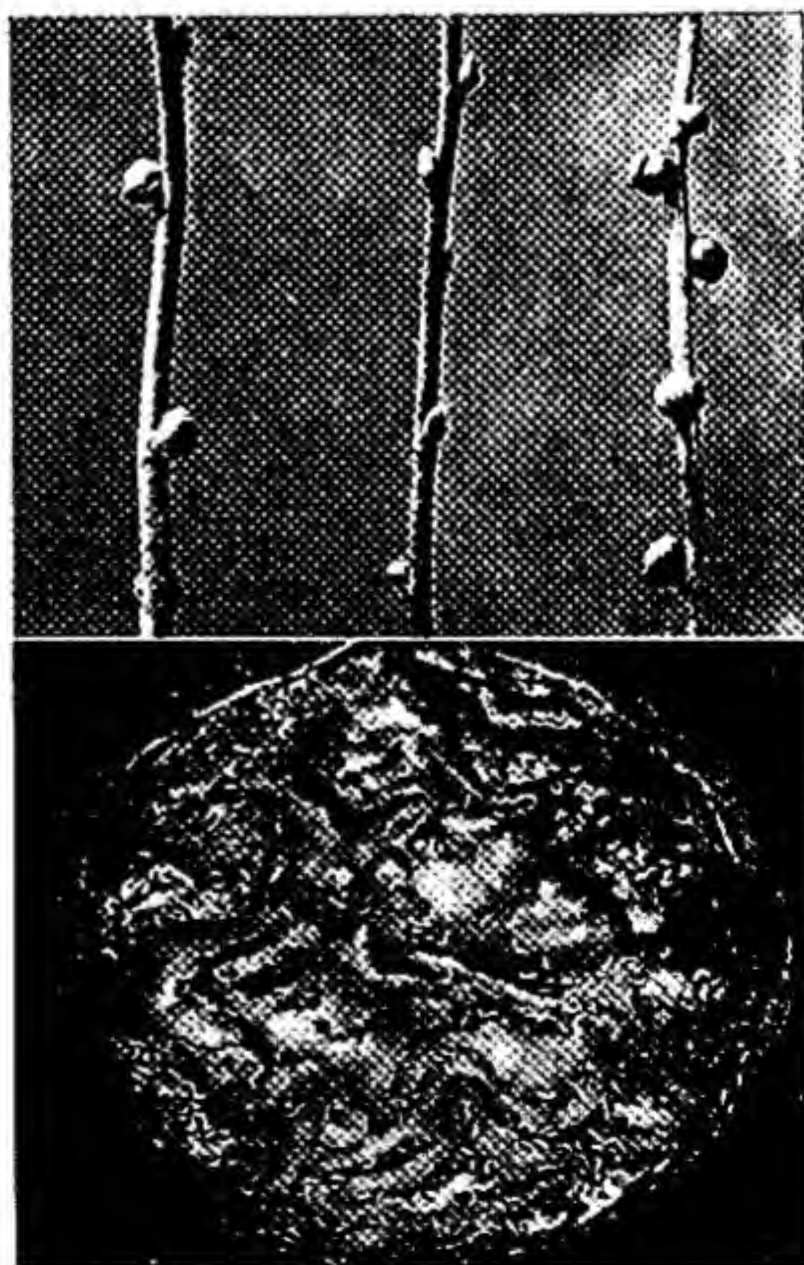
including dry dusts mixed with a suitable carrier and ready for application; wettable powders to be dissolved in water and applied as sprays; in liquid form for spraying; in canisters combined with a suitable pyrotechnic for use as a smoke, or in powder form for raking or forking into the soil as a soil insecticide. All these are proprietary formulations and manufacturer's instructions should be obtained and followed. In some instances BHC imparts a musty taint to the crops on which it is used. This is particularly liable to happen when samples containing other isomers of BHC in addition to the gamma isomer are used as soil insecticides on land on which root crops are to be grown immediately. Gamma-BHC is not effective against red spider and as it is likely to kill many of the insects which prey on red spider its use at unsuitable times of the year, for example after mid-April on fruit trees, may result in an increase of red spider as when DDT is used. It is poisonous to warm-blooded animals but is unlikely to cause any injury at the concentration usually employed. Gamma-BHC is also known as lindane.

BICOLOR This botanical term means 'two coloured' and is usually applied to flowers in which one colour is contrasted with another.

BIENNIAL A plant that takes approximately two years to germinate, grow, flower and produce seed, after which it dies. It may be contrasted with the annual which also dies after seeding but completes its cycle in one year, and with the monocarpic plant which dies after seeding but takes an indefinite number of years to reach this stage. Some very popular garden flowers are biennials, e.g. Canterbury bells and foxgloves, but a great many plants which are treated as biennials in gardens and are often referred to as such, are in fact, perennials which would flower and seed many times if given suitable conditions. Hollyhocks, sweet williams, wallflowers and double daisies are examples of this latter class. They are commonly sown in late spring, planted out and allowed to flower

the following year after which they are destroyed, but this does not make them true biennials.

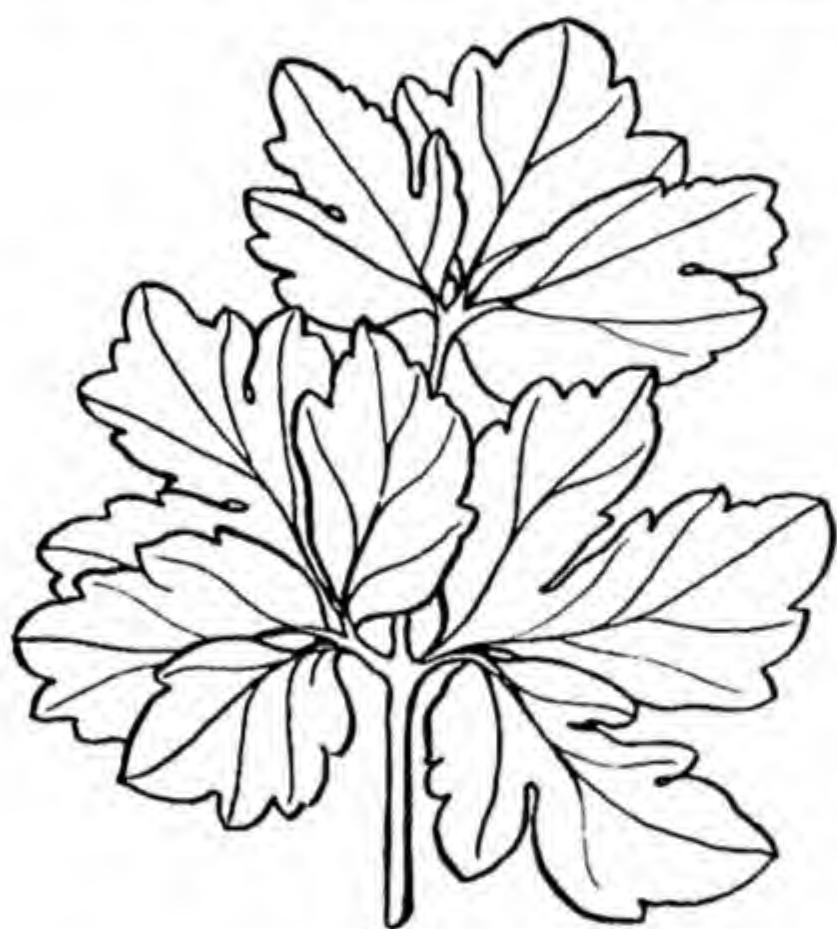
BIG BUD A most troublesome condition of currants, principally black currants, though red currants are sometimes affected and big bud has even been occasionally reported on gooseberries. The dormant buds become swollen and globular, standing out prominently on the naked stems in winter. This swelling is caused by the presence within the buds of great numbers of minute white mites. These mites leave the buds in the spring and migrate to other buds. It is during this migration that they are most vulnerable and a strong application of lime sulphur applied in spring when the most forward leaves are an inch in diameter will usually destroy most of the mites. The lime sulphur is used at twice the normal winter strength and may cause



Big Bud of blackcurrants. Above, the swollen buds; below, an enlarged photograph showing the big bud mites

some leaf scorching but the bushes usually recover quickly. However, this treatment cannot be used on sulphur-shy currants of the Edina type. Where only a few buds are affected they may be picked off in late winter and burned. In very severe cases it may be necessary to prune back all growth to within a few inches of the ground in winter and burn the prunings.

BIPINNATE Twice pinnate; a botanical term applied to leaves which are composed of several separate segments which are themselves divided into separate segments.



Bipinnate leaves

BIRDS From the gardener's standpoint birds may be roughly classified in three groups, one composed of kinds such as the owls, wagtails, flycatchers, tits, swallows, woodpeckers, swifts, robin and hedge sparrow, which are entirely, or almost entirely, beneficial; a second composed of such birds as the thrush, blackbird, starling, magpie, rook, jay, cuckoo and chaffinch, which do some harm but probably, on balance, more good and so are to be reckoned as friends rather than foes; and a third, of which the wood pigeon, stock dove, bullfinch and house sparrow are notorious members, which do more harm than good and are, in consequence, to be regarded as enemies. Jays can do considerable damage to peas

and fruit but they also eat great numbers of insects, slugs, mice and other garden pests. They can be kept away from the pea pods if pea rows are covered with netting. Small fruit bushes can be protected in the same way. Some birds pick up seeds but few are capable of scratching and so have no means of getting at seeds which have been properly covered; in any case vulnerable seeds can be efficiently protected with dark thread drawn tightly between sticks so as to form a network over the seed bed. Sparrows often do a great deal of damage to brightly coloured flowers, especially to early blooms such as those of crocus and polyanthus. Here again the most effective remedy is to cover the plants with tightly drawn and dark-coloured thread. Bullfinches attack the buds of fruit trees and bushes, often pecking them out quite wilfully and not for the sake of food. Protection with netting is often the only effective remedy though bird scarers fixed among the trees may have some effect. The damage, incidentally, is usually done in late winter as the buds commence to swell.

Tits are also sometimes accused of destroying buds but on closer examination it will almost always be found that these buds are already attacked by insects and that it is the latter, not the buds themselves, that the tits have been after. Even if such buds had not been damaged by the tits it is very un-



Bitter pit of apples

likely that they would have developed into healthy shoots or flowers. A thorough spraying with alum (4 ounces to 1 gallon of water) will make ornamental fruits unpalatable to birds but must not be used on fruits intended for human consumption because of its astringent quality.

BITTER PIT A curious condition of apples, pears and, occasionally, quinces, in which the flesh just beneath the skin decays in small spots or patches, causing the skin itself to sink in a series of small, irregular spots, often slightly darkened in colour. The trouble is sometimes believed to be due to boron deficiency in the soil and a fertilizer application of powdered borax at the rate of 2 ounces to 30 square yards has been suggested as a remedy. At other times it appears that the disorder may be caused by an irregular flow of sap as it occurs severely in seasons during which periods of heavy rainfall alternate with periods of drought. Moreover some varieties are much more susceptible than others and may have to be eliminated altogether in gardens in which the trouble is common.

BLACK FLY The name given to one of the many species of aphid. This pest is also known as bean aphid, collier and dolphin fly. It is particularly common on broad beans but is also found on dwarf and runner beans, beetroot, spinach, turnips, rhubarb, docks and many other plants. Black fly usually congregates round the ends of tender young shoots. In the case of beans it is often possible to prevent an attack by pinching out the soft tip of each plant as soon as the first few trusses of pods are commencing to swell. The pest can be destroyed by spraying with nicotine, pyrethrum, derris or HETP.

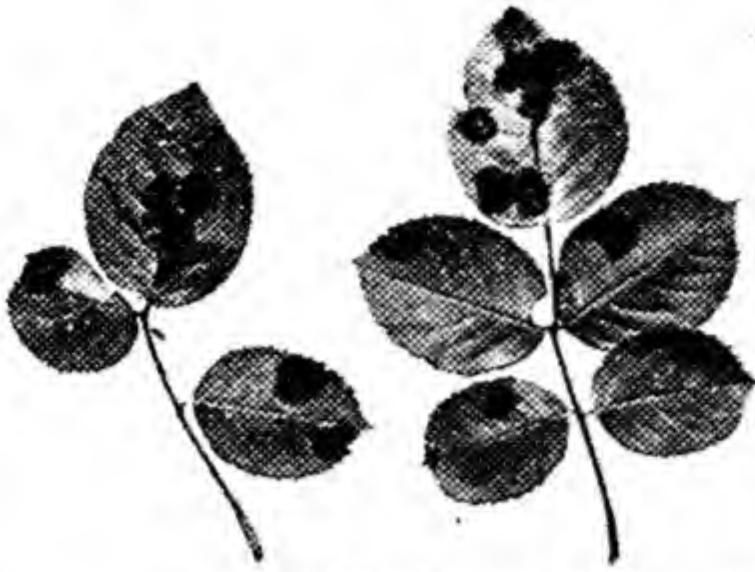
BLACKLEG A disease of potatoes so known because it attacks the haulm just above ground level causing it to decay and turn black. Later tubers may be affected and will rot to a jelly at the end at which they are attached to the plant. Usually only an occasional plant is attacked and the disease seldom does extensive damage. No remedy is known. All affected plants should



A broad bean shoot infested with black fly

be lifted and burned as soon as noted. No tubers showing a jelly-like rot at one end should be planted.

BLACK SPOT This name is sometimes applied loosely to almost any disease which causes black spots to appear on the plant attacked, but it properly belongs to one disease only which is caused by a fungus and confines itself to roses. The fungus attacks the leaves causing these to develop circular black spots which increase in size until the whole leaf is destroyed or falls off. It is one of the most serious diseases of roses and one of the most difficult to control. In winter resting spores of the fungus remain in the surface soil and from these new infections spread the following summer. Two methods of checking the disease are to remove the surface inch of soil from the rose beds in winter and burn it, replacing with fresh soil from some place in which roses have not grown, and to cover the whole surface of the bed in early spring with an inch-thick mulch of grass clippings so that spores cannot readily rise from the soil to the rose leaves. Such a mulch should be maintained throughout the summer and be disturbed as little as possible. Infected rose leaves should always be picked off and burned. If the disease has proved troublesome in other years it is wise to carry out preventive spraying with colloidal copper



Black spot on rose leaves

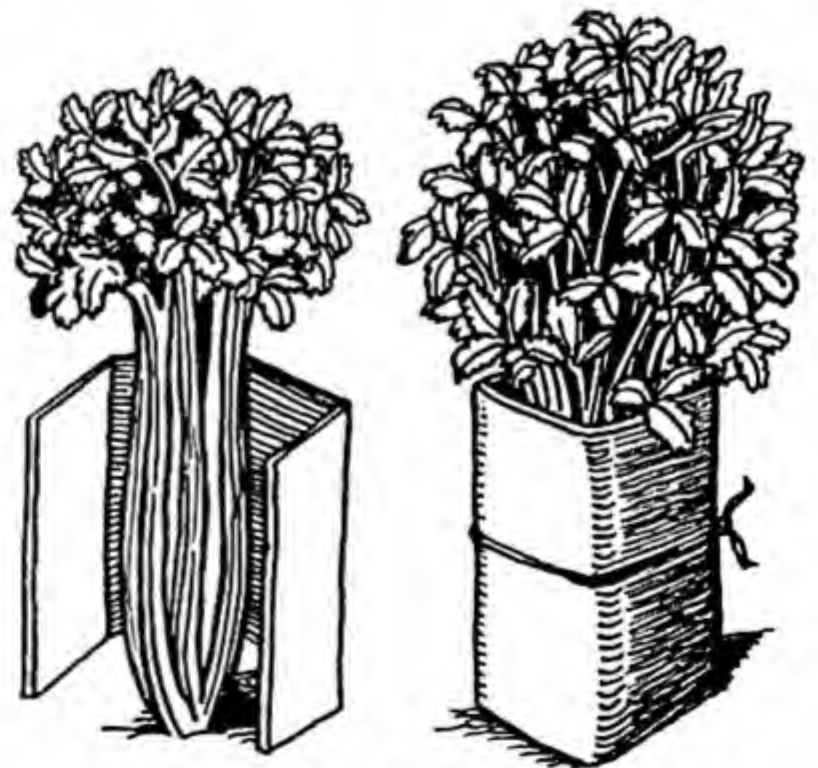
from April until August inclusive. If the disease makes its appearance, one rather heavy spraying should be given in mid-winter with copper sulphate, 1 ounce per gallon of water. This must not be used while any leaves remain on the plant as it is very caustic. It may be allowed to fall fairly heavily on the soil to kill spores lying on it. Another treatment is to spray with colloidal copper white oil emulsion after pruning and, if infection occurs subsequently, at three-week intervals until the autumn.

BLANCHING An important item in the cultivation of certain vegetables, notably leeks, celery, endive and seakale. The purpose of blanching is to prevent the normal colouring matter of leaf or stem being produced and so render vegetables more delicate in flavour and in some instances more attractive in appearance. Blanching is always carried out by excluding light, but the methods employed vary considerably. With celery and leeks it is effected by drawing soil round the stems or by enclosing these in cardboard or paper collars. Endive is frequently blanched by inverting a saucer, slate, or piece of wood over the heart of each plant, while seakale is usually blanched by bringing it into a darkened shed or cupboard. As a rule, blanching checks growth and therefore must not be carried out until the plant has reached a satisfactory stage of development, e.g. celery blanching is usually delayed until September, by which time the plants are well grown. An exception can be made with

leeks which can be blanched a little at a time by gradually drawing soil round the growing stems from midsummer onwards. By this method blanched stems of exceptional length can be produced.

BLEEDING The gardener describes as 'bleeding' any overflow of sap from a plant. It is liable to occur in spring on almost any shrub or tree that has been pruned so late that the pruning wounds have not had an opportunity to heal over. Sometimes bleeding can be quite spectacular. In the case of grape vines which have been pruned late in the winter quantities of sap may drip from the severed ends of the rods. It is widely held amongst gardeners that bleeding is harmful, but in fact scientific investigation does not seem to uphold this view. As a rule, the bleeding stops of its own accord after a few days and the wound heals over quite normally. Various remedies have been suggested, as for example the searing of wounds with a red hot iron, or their treatment with a caustic substance such as a styptic.

Bleeding is also liable to occur in beetroots if the skin or flesh is damaged, and can result in a serious loss of colour which may spoil the appearance of the roots. In consequence it is usually recommended to twist off the tops of beetroots when they are lifted and not to cut them off with any sharp implement which might damage the flesh.



Blanching celery

BLIGHT This term is used very vaguely by most gardeners to describe almost any kind of pest or disease. Thus a bad infestation of greenflies may be referred to as blight and so will the black sooty mould (caused by a fungus) which may quite likely follow this infestation. Because of this vagueness it is an unsatisfactory term and one which would be best dropped. It is only justifiably used in connection with the common potato disease known as Late Blight. This is caused by a fungus (*Phytophthora infestans*) which attacks the leaves causing black spots to appear, which quickly spread so that the whole haulm withers. Later the disease may pass to the tubers, causing soft, brown patches of decay in the flesh. This disease can be prevented by spraying the haulm thoroughly with Bordeaux mixture. The first application should be made early in June followed by another, if necessary, three or four weeks later.

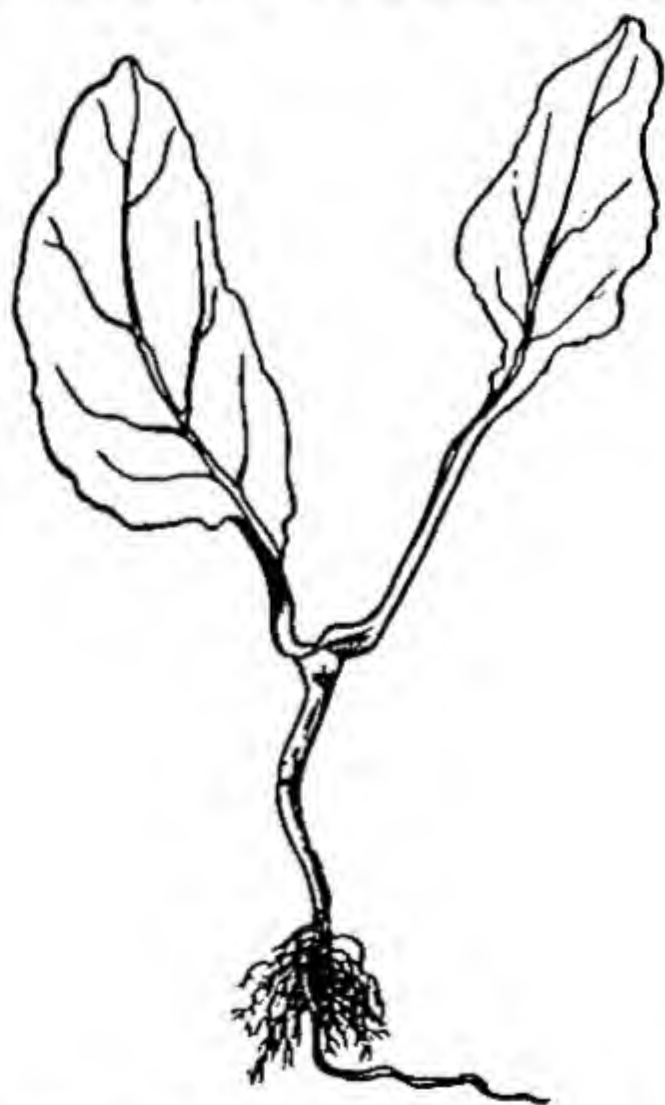
BLIND A plant is said to be blind when loss of the growing point causes cessation of growth. This condition is frequent in the case of seedlings of cabbage and other members of the brassica family, particularly if these have been attacked by maggots of the cabbage root fly. At first sight the plants can appear quite healthy, but a closer examination will show that they have no central growing shoots and that, in fact, growth is at a standstill. Such plants are quite useless and should be discarded, as no treatment will make them regain their growing points.

BLINDS The gardener may use blinds of one kind or another in the greenhouse and occasionally on frames, either to protect plants from excessive sunshine or in an attempt to prevent excessive loss of heat at night. Blinds used mainly for shading are generally made either of hessian or split bamboo. They should be fitted in such a way that they can be quickly removed or rolled up when not required. Blinds of this type are not very useful for trapping heat and the most effective material yet discovered for this purpose is aluminium foil. This foil has remarkable heat insulating properties and is said to give an insulation

equivalent to a 2-inch thickness of cork. Aluminium foil is extremely flexible and, if mounted on some tough paper core, is fairly durable.

BLOOD All blood contains nitrogen which is valuable as a plant food. Fresh blood is unpleasant to handle and is seldom used, though it may be applied freely on vacant ground and immediately dug in. However, it is dried blood that is commonly used and this is a fine dry powder easy to handle and suitable for use either on vacant ground or around plants in growth. An average sample contains about 12 per cent nitrogen and can be applied at rates up to 2 ounces per square yard or as a liquid manure well stirred into water at rates up to 1 ounce per gallon. As a rule it is not fully soluble, hence the instruction about stirring well to keep it in suspension.

BLOSSOM-END ROT A disorder of tomatoes which causes a small dark spot to develop on the fruit at the end farthest from the stalk. This spot usually increases in size fairly rapidly and becomes black. The flesh beneath the spot shrinks and that part of



A blind cabbage plant. Note the absence of a growing point

the fruit becomes flattened. Despite its appearance to the contrary this trouble is not caused by a fungus but is the result of a collapse of some of the fruit cells due to lack of moisture. The disorder is always an indication that at some previous time, probably several weeks earlier, the soil has been dry. Affected fruits should be removed and every care taken to see that the plants have an adequate water supply at all times.



Blossom-end rot of tomatoes

BLOSSOM FALL, see *Bud Stages*.

BLOTCHY RIPENING A term applied to a condition of tomato fruits in which, instead of ripening evenly all over, some parts remain green or at most only become yellowish. It is often associated with potash deficiency in the soil but may also be brought about by inadequate watering, possibly because when water is short it is difficult for the roots to take up sufficient potash. The disease can be prevented by providing ample potash in the soil and plenty of water at all times. If it occurs it is wise to water plants every few days with 1 pint each of a solution made by dissolving 1 ounce of sulphate of potash in 5 gallons of water.

A rather similar blotchy appearance of the fruits can also be caused by virus disease but in this case the flesh does not remain hard and unripe as in true blotchy

ripening. Virus disease cannot be cured by applications of potash or, for that matter, of anything else.

BLUEING, see *Acid*

BLUESTONE, see *Copper Sulphate*.

BOG GARDEN This is a construction intended to simulate the marshy conditions which are often found near rivers and on low-lying ground generally, and in which a specialised type of flora exists. Most bog plants will not tolerate long periods of complete inundation, nor will they withstand long periods of comparative drought. The problem, therefore, is to arrange the water supply so that the water level in the bog garden is more or less constant, winter and summer. If the water supply is entirely artificial, as for example from a well or water main, this is a fairly simple problem, as it consists mainly in regulating the flow of water by suitably placed cocks. If, however, the bog garden is made as an adjunct to a natural stream or pool, constructional problems are likely to arise. It is almost certain that sluice gates will be necessary to regulate the flow of water to the bog garden, maintaining the level in summer when the flow is at its lowest, but allowing surplus to escape freely at flood periods in the autumn and winter.

Most bog plants thrive best in a somewhat spongy soil mixture. It must never be so close in texture that free percolation of water is impeded. A suitable general mixture consists of rather heavy, fairly rich loam. Avoid mud from pond bottoms and stream sides. Do not use dung and so far as artificial manures are concerned at most give a light sprinkling of bonemeal.

Small bog gardens in which the supply is to be entirely artificial must always be enclosed in cement or with beaten clay, the construction in the former case being very similar to that of a cement lined pool with the two important differences that there must be more frequent and larger outlets for surplus moisture and that the whole cemented area must be filled with soil. Concrete for this purpose should be prepared in exactly the same way as for pool construction and the walls of the bog gar-

den should be similar in thickness to those of a pool.

In the case of 'natural' bog gardens—that is to say those made alongside an existing stream, river or pond—it is usually quite unnecessary to use cement in any part of the construction, in fact if the soil is naturally of a heavy clay nature, it may even be necessary to break this up somewhat and open it with sand or broken clinkers to prevent too sluggish a movement on the part of the water. This is essential, for, though all bog plants must have abundant moisture, few thrive in stagnant conditions such as may occur where there is practically no movement of water through the soil.

There are a great many beautiful plants suitable for planting in bog gardens. Among the best are moisture-loving primulas such as *Primula japonica*, *P. pulverulenta*, *P. Helodoxa* and *P. Florindae*, dodecatheons, astilbes, trollius, calthas, lysichitums, *Iris Kaempferi*, *Iris sibirica* and Royal Fern (*Osmunda regalis*).

BOLTING A term used to describe plants that produce flowers and seeds prematurely. Thus lettuces will normally make a good and serviceable 'heart' of leaves and hold it for several weeks before they commence to run up to flower, but under some circumstances they may either form no hearts at all or start to run to flower very soon after forming hearts. This is particularly likely to happen in very hot, dry weather. Bolting is often caused by a check to growth either through drought or starvation.

Sometimes 'bolting' is an inherited tendency and breeders take pains to eliminate it from their stocks by careful selection and the rejection of all plants that show any inclination to bolt.

BONE MANURES The bones of all animals contain certain elements that are valuable as plant foods and particularly phosphorus and calcium, together with smaller quantities of nitrogen. Unfortunately whole bones decompose so slowly in the soil that it takes many years for these

plant foods to be liberated. In consequence such bones are of little value to the gardener. If, however, the bones are crushed into a fine powder, the rate of release of plant foods is greatly increased. As a result, finely ground flour is not only a valuable fertilizer, but it is also, contrary to popular opinion, a fairly quick-acting one. Coarser grades of bonemeal will give up their supplies of phosphorus more slowly, and crushed bones, in which many of the pieces may be the size of peas, are sometimes used in the preparation of vine borders and other more or less permanent beds, because they will provide supplies of phosphorus over a number of years. It will be seen, therefore, that the rate of action of bone manures is proportionate to the fineness to which they are ground.

Frequently, bones are steamed to extract the gelatine from them before they are prepared as garden fertilizers. In the case of steamed bones there is very little nitrogen left and their value as a plant food can be determined solely on their content of phosphoric acid. Analysis, in any case, varies greatly from sample to sample. For raw bones it may be anything from 15-32 per cent of phosphoric acid and up to 5 per cent of nitrogen. With steamed bones, the phosphoric acid content will be a little smaller than that of raw bones with the nitrogen content as low as 1 per cent. The usual rate of application for bone manures is 3 to 4 ounces per square yard with very finely ground samples such as those described as bone flour, and up to 8 ounces for the coarser grades of meal and crushed bone. Bonemeal can also be used with advantage in potting composts at the rate of about 4 ounces per bushel and is preferred by some gardeners to the smaller quantities of superphosphate of lime recommended in the standard John Innes potting composts.

Bonemeal is a perfectly safe fertilizer which can be used for all kinds of plants. Coarser grades should, as a rule, be used in the autumn or winter so that they may become partially decomposed before plants require the food which they contain. The finest samples can be used as spring dressings.

BORAX This natural salt is used in the garden as a fertilizer and also as an insecticide. As a fertilizer it provides the most convenient source of boron, one of the essential plant foods which is, however, required in such minute quantities that it is generally present in the soil in sufficient quantity for the plant's needs. Boron in excess acts as a plant poison and care must be exercised in its application. Boron deficiency occurs in a few places and is responsible for the disease known as brown heart in swedes, turnips, beetroot and mangolds. The central leaves turn brown and wither, the crown becomes brown and decay develops in the centre of the root. Where boron is discovered to be lacking in the soil, borax can be applied at the rate of 2 ounces per square rod in spring. As an insecticide it is used principally as an ant killer, equal parts of borax and castor sugar being mixed together and placed where ants are observed.

BORDEAUX MIXTURE One of the most valuable of general purpose fungicides, that is to say chemical mixtures which have the property of killing fungi. Bordeaux mixture is prepared from copper sulphate and lime and gets its name from the fact that it was developed in the Bordeaux area of France as a remedy for downy mildew of vines. It was subsequently discovered that Bordeaux mixture is effective against many other diseases caused by fungi and that it can be used with safety on a great variety of plants. It is now the standard remedy for potato disease (*phytophthora*) for which purpose at least two applications should be given, the first late in June or early in July and the second three or four weeks later. It can also be used to control scab disease of apples and pears and is particularly suitable for the latter, as it does not cause leaf scorching so readily as lime sulphur.

Three formulae are in general use in gardens and they are described respectively as strong solution, standard solution and reduced solution. The recipes are as follows:

Strong Solution: For use against potato disease (blight) and on other strong-leaved plants not liable to be scorched.

9 oz. copper sulphate.

6 oz. quicklime.

5 gals. water.

Standard Solution: For use against apple and pear scab and as a general fungicide.

6 oz. copper sulphate.

6 oz. quicklime.

5 gals. water.

Reduced Solution: For use on tender-leaved plants liable to be scorched.

4½ oz. copper sulphate.

9 oz. quicklime.

5 gals. water.

When Bordeaux mixture is prepared from the raw ingredients, fresh hydrated lime can be used in place of quicklime, but it is desirable to increase the quantities slightly, say to 7 oz. for the strong and standard solutions and 10 oz. for the reduced solution.

The copper sulphate should always be dissolved first of all in a portion of the water and the quicklime slaked in the remaining water in a separate vessel. Then add the slaked quicklime a little at a time, to the copper sulphate solution, stirring all the while. The mixture should be used at once as there may be a tendency for it to precipitate after a time. It is advisable to test the strong solution before use. This can be done with blue litmus paper—if the paper turns pink, a little more lime should be added until the litmus paper remains blue. The fact that it turns pink is an indication that the mixture is still slightly acid, a condition in which it may cause damage to foliage.

Bordeaux mixture can also be purchased in various commercial brands as either a paste or a powder, ready for mixing with water. When using all these proprietary brands, manufacturer's instructions regarding strength must be followed.

BORDER A term with a rather wide and loose application in gardens, but in general it may be taken to refer to any bed which is prepared for some special purpose. An example is the vine border which is usually completely enclosed by concrete or brick walls to prevent the vine roots from penetrating beyond the specially prepared soil with which the border is filled. Then we have the herbaceous border devoted exclusively to the cultivation of hardy her-

baceous perennials; the shrub border devoted exclusively to shrubs; the mixed border which may include shrubs, herbaceous plants and even annuals and semi-tender plants, such as pelargoniums, marguerites and antirrhinums, and the annual border devoted exclusively to plants raised from seed and flowering in their first season.

The term is sometimes used to distinguish certain kinds of plants which are hardy enough to be grown in the open from other similar kinds which need greenhouse protection. For example one class of carnation is known as border carnation because it can be grown outdoors without protection in contrast to the tree or perpetual flowering carnations which require protection in winter. Similarly with chrysanthemums the term 'border chrysanthemum' is sometimes used instead of early-flowering chrysanthemum to denote any variety which is hardy enough and flowers early enough to be grown in the open. Border phlox is occasionally used to distinguish varieties of *Phlox paniculata* (*decussata*) from the alpine phloxes derived from *P. subulata* and other species.

BORECOLE An alternative name for Kale.

BOTANY The scientific study of plants. While the practical gardener is under no compulsion to turn himself into a botanist, there is no doubt that some knowledge of the subject will make him a better gardener.

There are two main divisions, plant Physiology dealing with the manner in which plants function, and Taxonomy, dealing with form and classification.

There are too many good elementary books on the subject to enumerate. The gardener should investigate his public library and be guided by his own personal preferences.

BOTRYTIS A fungus known as *Botrytis cinerea* attacks a great variety of plants causing rapid decay of their tissues followed by an outgrowth of fluffy grey mould on the diseased portions. For this latter reason the disease is often known as 'grey mould'. The decayed tissue usually turns black and this



A tomato stem attacked by Botrytis cinerea

feature has given rise to another popular name 'blackleg' but this is also the name of a quite different disease of potatoes.

Botrytis rot may be found on vines, tomatoes, cucumbers, melons, marrows, lettuces, strawberries, pelargoniums, roses, sunflowers and many other plants. It thrives in damp, cold conditions, is most prevalent in autumn, can be a plague in badly ventilated greenhouses and is always very difficult to control once it starts. Plants may be sprayed with liver of sulphur (potassium sulphide), colloidal sulphur or Bordeaux mixture, or they may be dusted with flowers of sulphur. Badly infected plants should be removed and burnt at once. See also *Grey Mould*.

BOTTOM HEAT Heat applied from below, usually to warm beds of soil used in the propagation of tender or half-hardy plants or those which for one reason or another are somewhat difficult to strike from cuttings or raise from seed. One ancient method of producing bottom heat is by means of a bed of decomposing man-

ure known to gardeners as a 'hotbed' (*q.v.*). The most modern system relies on electrically warmed cables (see Electrical Heating, page 120) which are actually buried in the soil or in a layer of sand or ashes immediately below it. Sometimes the hot water pipes used for normal greenhouse heating are passed through a bed of soil which may itself be covered by a frame further to trap heat and maintain a close atmosphere in which seeds germinate most freely and cuttings root most readily.

An important point to note is that whatever system is used, the soil must only be warm and not raised to a high temperature which would do more harm than good. As a rule the temperature for hotbeds is between 65 and 75 degrees. Moreover as the warmth tends to dry soil out rapidly, it is usually necessary to employ a moisture-holding compost—that is to say one containing plenty of peat or leaf mould which will soak up moisture like a sponge.

BOWLING GREEN A lawn developed specially for the purpose of the game of bowls. For this an absolutely true and level surface is required and very close mowing is necessary, so that the surface is almost as smooth as that of a billiard table. Only certain grasses will put up with this close mowing and give the required surface. Favourites are the finer fescues, such as Chewing's fescue and Sheep's fescue and the bent grasses, particularly Brown Bent and New Zealand Bent all of which can be raised from seed sown in the same way as for other lawn grasses. Another method is to

turf the bowling green with the very fine, sea-washed turf usually sold as Cumberland turf. A drawback to this is that the turf frequently fails to thrive in inland districts and becomes patchy and moss- or weed-infested after a while.

The dimensions for a full-sized bowling green are 126 feet square and there should be a surrounding ditch one foot wide and about 6 inches deep. In addition there should be a surrounding path or grass border which can be of any convenient size. Crown greens are constructed with a rise of from 8–10 inches in the centre.

BRACT A modified leaf found at the base of a flower stalk, or the stem of a cluster of flowers, or forming a part of the flower-head itself (as in the involucral bracts found in members of the daisy family). Bracts are sometimes highly coloured and as decorative as the flowers with which they are associated or even more so. Examples of this kind are to be found in *Salvia Horminum*, which has showy purple bracts, the poinsettia (*Euphorbia pulcherrima*) which has scarlet bracts and *Saxifraga Griesbachii* which has crimson bracts.

BRAND The popular name applied to a fungal disease of sweet williams. Occasionally it is found on other species of dianthus. Brown spots, more or less circular in outline, appear on the undersides of the leaves and may spread very rapidly. Affected plants are so unsightly that they can scarcely be overlooked. There is no cure once the disease has started and affected plants should be pulled up and burned as soon as noted. If the disease has proved troublesome it is wise to spray plants occasionally with colloidal copper as a preventive measure.

BREAK A term much used by chrysanthemum growers and occasionally in connection with other plants. A break is a branch or fork and to make a plant 'break' means to make it produce a branch or fork when otherwise it would not do so. Chrysanthemum growers often pinch out the growing tips of their plants quite early



Brand disease on a sweet william leaf

in the season to make them branch or fork early. If a rooted chrysanthemum cutting is left to its own devices, it will after a time, produce an abortive flower bud at the top of the stem, which will prevent further lengthening of this particular stem and force it to produce side shoots or breaks. In consequence, this abortive flower bud is often known as the 'break bud'.

BREAST-WOOD Shoots which grow forward from fruit trees trained against walls or espalier fences and in consequence are inconvenient for training against the walls or fences. Breast-wood must usually be cut out and this is generally done during the summer so that light and air may penetrate to the fruits and also to more favourably placed shoots.

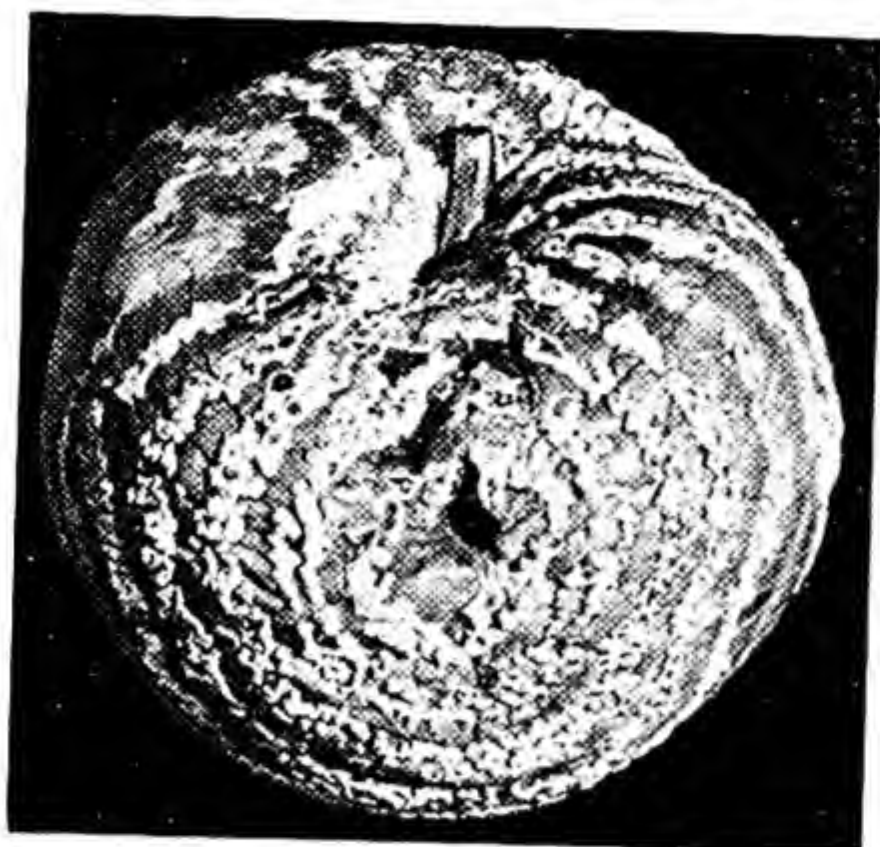
BROADCAST The practice of scattering seeds more or less evenly all over the surface of soil instead of confining them to straight lines or drills. In the garden broadcasting is used for grass seed to form a lawn and occasionally for seed of annuals which are to form irregular groups. Sometimes cabbages, broccoli, brussels sprouts and other plants which are to be transplanted as seedlings are raised from broadcast seed, as this economizes space, but a drawback is that weeding is much more difficult than when the seeds are sown in straight lines with clear ground between them. A little skill is required to broadcast seed evenly by hand. It should be done with a quick flick of the wrist and care should be taken to pick up a similar quantity of seed each time. Various implements have been devised for the purpose of broadcasting seed, one of the most effective being the fiddle drill which consists of a bow not unlike that used for playing a fiddle but with string in place of catgut, and a revolving disk, usually of metal. The string of the 'bow' is wound round an axle in the centre of the metal disk and by moving the bow backwards and forwards the disk is made to revolve, first in one direction and then in the other. Seed falls from a bag on to the disk and is thrown from it by centrifugal force. Broadcast seed may be covered either by scattering fine soil over it or by raking the surface after sowing.



Sowing grass seed broadcast

BROWN HEART A deficiency disease, that is to say one caused by a shortage of some essential food material, in this case boron. It affects turnips, swedes and beetroots causing internal brown decay of the roots. Good general cultivation will help to prevent the disease and so will an adequate water supply. Where these measures fail it will probably be necessary to add extra boron which may be done by top-dressing the soil with powdered borax at the rate of 2 ounces to 30 square yards prior to sowing the crop.

BROWN ROT A most distinctive fungal disease of fruits, including apples, pears, plums, cherries and, very occasionally, peaches and nectarines. The disease affects the fruits themselves and, to a lesser degree, the spurs from which they grow. The fruit develops a brown decay which spreads rapidly until the whole fruit may be affected. Whitish or buff-coloured pustules appear on the decayed flesh and are arranged in a series of concentric rings. This striking feature makes the disease easy to recognize. Later the whole fruit shrivels and may become so mummified that it hangs on the tree throughout the winter. Such mummified fruits are centres of infection and should, in consequence, be removed and burned whenever seen. Fruit spurs may also be attacked and killed. When pruning a close watch should be kept



Brown rot of apples

for dead or dying spurs and all such should be removed and burned. There is no remedy for the disease itself but as the fungus almost always finds entry through some bruise or insect injury (with apples it often follows in the wake of codling moth) anything done to prevent such damage will also reduce the frequency of brown rot.

BRUTTING The practice of fracturing young shoots about half-way and leaving the broken ends hanging. It is used as a form of summer pruning and is principally applied to hazels.

BUCK-EYE ROT A disease of tomato plants caused by the fungus *Phytophthora parasitica*. This fungus is carried in the soil and reaches the fruits in splashes of water or by direct contact of lower fruits with the soil. The resultant decay proceeds in concentric rings of dark and light brown, hence the name Buck-eye. All diseased plants should be burned and care taken to tie up lower trusses and prevent water splashes from reaching the fruit.

BUD An embryo shoot, flower or cluster of flowers. Buds vary greatly in shape and character and a study of them is often of great practical assistance to the gardener, enabling him to judge the progress of growth and to decide how and when a shoot should be pruned or whether any

pruning is necessary. In particular, the fruit grower must learn to distinguish between growth buds and fruit buds. In general, growth buds of fruit trees are comparatively small and lie close against the shoots, whereas fruit buds are larger and more prominent and often stick out from the shoot or form extensive clusters known as 'spurs'. A growth bud contains within itself the embryo of a shoot, but it may in time, change its character and develop into a fruit bud which, by the way, contains not a fruit but a flower bud or buds capable of producing fruits.

Terminal bud describes a bud found at the extreme tip of a shoot. It may be either a growth bud or a fruit bud. Some varieties of fruit tree frequently produce fruit buds at the tips of shoots and in consequence are known as tip-bearers. Apple Worcester Pearmain is of this type.

An **axillary bud** is one which is found in the axil of a leaf, that is to say in the angle between the leaf and the stem on which it grows.

'Bud scales' are the scale-like covering of the bud and as the bud develops, these



An axillary bud



A crown bud

scales loosen and eventually fall off—a condition known as bud burst and important to the gardener in the case of fruit trees, because it is the signal for the application of certain sprays such as DDT against Apple Blossom Weevil, or for the cessation of the use of other sprays, such as tar oil or DNC winter wash. Shortly after this, the fruit buds of apples, pears, plums and cherries open to reveal the clusters of flower buds within, a state of development known as green bud and the signal in the case of apples and pears, for the start of anti-scab spraying. Later still, these flower buds will themselves expand sufficiently to show some petal colour, a condition known as pink bud in apples and white bud in pears. This is a signal for the second pre-blossom spraying against scab disease in these fruits.

Crown bud is the term used by chrysanthemum growers to denote flower buds (other than the first abortive flower bud or break bud) which are surrounded by shoots, in distinction to terminal buds which are flower buds surrounded by other flower buds and with no shoots to continue growth. (See *Stopping*.)

BUD BLAST A fungal disease of the flower buds of rhododendrons which kills them. They turn brown or grey and develop black spots but remain fixed firmly to the stems. All affected buds

should be removed and burned. Bordeaux mixture may be applied fortnightly in spring until the buds start to open, and monthly in summer after the flowers have faded.

BUDDING A method of grafting widely used for the propagation of certain plants, notably apples, pears, plums, cherries, peaches, nectarines, apricots and roses.

As in other forms of grafting, the essential operation is the joining of a portion of the plant to be increased (this portion is known as the scion) to the roots of another plant (known as the stock) which will provide it with nourishment. The essential difference between budding and other forms of grafting is that in budding the scion consists of one bud only, with a small piece of bark attached, whereas in other methods of grafting the scion is formed of a shoot or portion of shoot containing several buds.

The method varies in detail according to the kind of plant being budded but the general principles are the same. Budding is done while the plant is in full growth, usually some time between midsummer and the end of August. Buds are cut from firm young shoots of the current year's growth. The buds near the tips of these shoots are usually too young and immature while those at the base may be poorly developed or over-ripe. In consequence it is the buds in the middle portion of such shoots that are most desirable. They should be plump and undamaged.

The shoots which are cut from the parent plants to provide these buds, are known as 'budding sticks'. They are prepared by



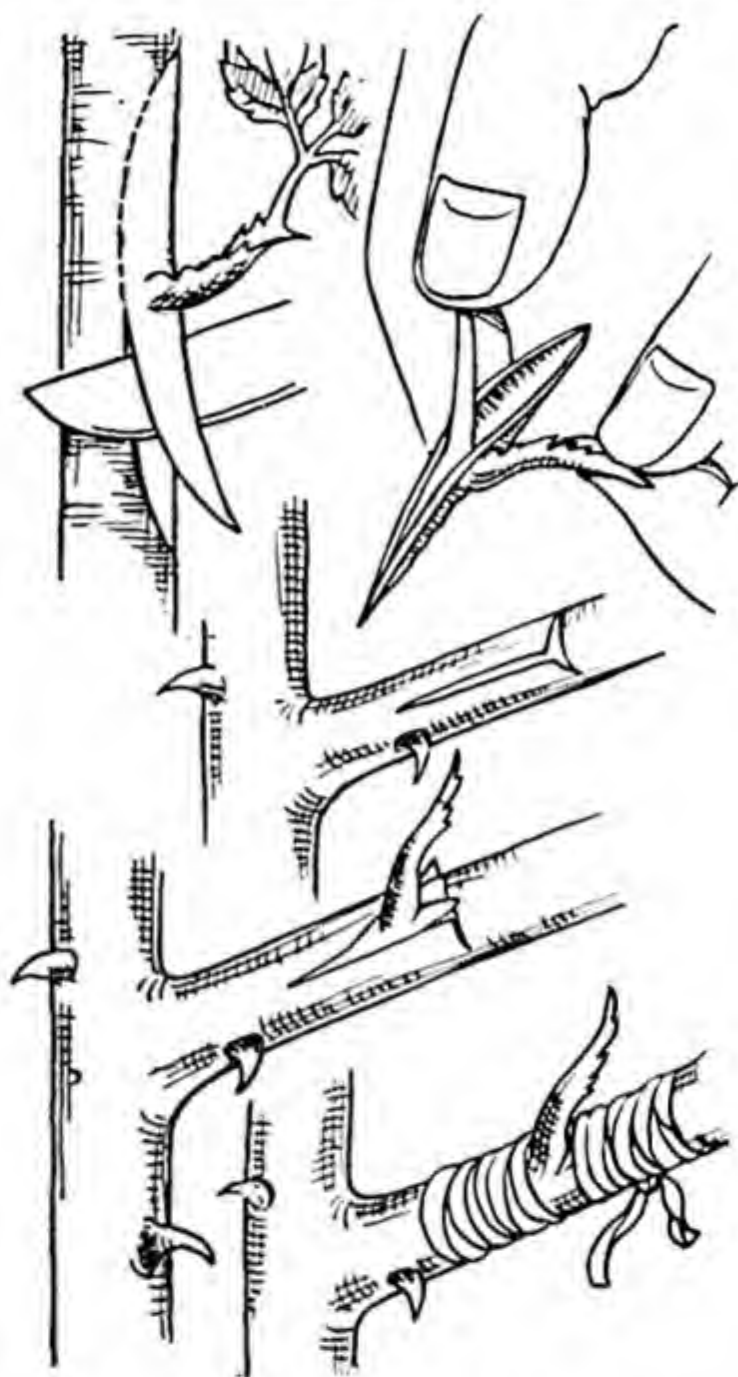
Rhododendron bud blast

cutting off the unripened tips and also the leaves, but the leaf stalks should be left. The budding sticks should then be tied up in small bundles according to variety, carefully labelled and placed, right-way up, in a jam jar containing about half an inch of water.

Stocks are usually smaller than those used for grafting (see page 105). In general, budding is only satisfactory on fairly young stocks or on young shoots produced from older stocks. It is seldom possible to insert buds satisfactorily where the bark is thick, hard and old and a good test to ascertain whether the stock is in suitable condition for budding is to make a small L-shaped incision in the bark and then try to lift the flap of bark formed in this way from the underlying wood. If the bark lifts freely and cleanly, the stock is ready, but if it adheres to the wood and can only be torn from it, the stock must be left a few weeks longer; watering the roots freely may also help.

The commonest method of budding used is that known as 'shield budding'. The stock is prepared to receive the bud by making a T-shaped incision in it and then carefully lifting the flaps of bark on each side of this incision. For this purpose a budding knife with an ivory handle like a scalpel is the most convenient instrument. The blade is used to make the incision and the thin end of the handle to lift the bark without injury.

A bud for shield budding is then cut from the budding stick with a shield-shaped portion of bark attached as shown in the illustration. The knife should be inserted about $\frac{1}{2}$ inch below the bud and drawn out about $\frac{1}{2}$ inch above it and should not penetrate more than half way through the shoot. The bud is then held by the leaf stalk which has been left for this purpose. It will be seen that within the bark there is a tiny slip of wood which has been cut with it. Most experts like to remove this slip of wood by raising it with the point of the knife, gripping it with the thumbnail and flicking it out, but it is possible to make a good union without removing this wood. The next step is to cut the shield-shaped piece of bark squarely across about $\frac{1}{4}$ inch



Stages in budding a rose

above the bud. The pointed end of the shield is then slipped beneath the raised flaps of bark on the stock and the whole shield is pushed downwards until it lies snugly against the bark of the stock. In this position it is bound with broad, soft raffia or soft twine. Care should be taken to start the tie well below the T-shaped incision and to continue it well above this, so that the bark of the stock cannot gape. No further protection is necessary.

After a few weeks the bud should be examined. If it is still fresh and plump, it has almost certainly made a union with the stock; if it is dry and withered, it has died and another bud may be inserted on another part of the stock. If the tie is cutting into the bark, it should be removed and, should the bud appear at all loose, another tie should replace it.

Fruit tree stocks are usually budded between 6 inches and 1 foot above ground

level. Fairly young stocks are used for the purpose; they certainly should not be thicker than an ordinary walking stick and are usually rather less than this. The buds are placed directly in the bark of the main stems, usually one bud to a stock. Occasionally when standard or half-standard trees are to be formed, the stock is allowed to grow to a height of 5 or 6 feet and then a bud inserted high up at the level at which the first branches are to be formed. This form of top working is not very desirable, as there is always a danger that the head of branches will blow out at the point of budding.

Bush roses are usually budded on small seedling stocks and sometimes on young rooted cuttings. In both cases one bud is inserted direct on the main stem just below soil level. To enable this to be done a little soil is first scraped away with a trowel from around the stock. The soil is not returned immediately after budding, though it may be drawn back in the following autumn as protection for the bud in winter.

Standard roses may be budded on either wild English dog rose (*Rosa canina*) or on the Japanese brier (*R. rugosa*). With the former, strong and comparatively old stems are cut back in winter to a height of about 5 feet ($3\frac{1}{2}$ feet for half standards) and then, the following spring, each stem is allowed to form three young shoots near the top, all other shoots being rubbed out. In the summer one bud is inserted near the base of each of these young shoots. When the Japanese brier is used the buds are inserted direct in the bark of the main stem at a height of 5 feet above ground level for standards and $3\frac{1}{2}$ feet for half standards.

Another method of budding is known as 'patch budding'. Here the bud is cut from the budding stick with a square patch of bark the bud being in the centre of this. A similar patch is removed from the stock and the bud fitted into position and tied in place. Great accuracy is called for and this is most easily attained if a special knife with parallel blades is used, the blades being the right distance apart to cut opposite sides of the square patch at once. Such a knife can be made with razor blades fastened to a piece of wood.

Patch budding is used for walnuts and for these the patch is about 1 inch square, and the buds are cut from well-ripened growth made the previous season.

BUD DISEASE A name sometimes given to a withering of the flower stem just behind the bud or opening flower. It occurs in a good many different plants but is particularly common in roses and peonies. Various causes have been suggested but the trouble remains somewhat obscure. It may on occasion be due to attack by biting or sucking insects and sometimes to attack by fungus, but more often it appears to be a purely physiological condition, probably due to weakness. When big flowers such as those of roses and double peonies commence to expand, they require large supplies of moisture and food. If the plant is weak, and in particular if the flower stem is not very stout, it may be impossible for adequate supplies to reach the flower; as a result the stem commences to wither. Another possible cause is strong sunshine on the soft stem, and some experts believe this is particularly liable to cause damage if it occurs early in the morning while the stems are still wet with dew. Remedies take the form of spraying with an insecticide such as DDT to kill any possible weevils etc.; spraying with fungicide such as Bordeaux mixture or colloidal sulphur to kill fungi; feeding and watering the plant to counteract weakness, and shading the flower stems, particularly on the east side.

BUD DROPPING A trouble which often causes the loss of numerous flowers, particularly in tomatoes, runner beans, sweet peas, lupins and begonias. Bud dropping is not caused by insect or fungal attack but is a purely physiological disorder due to unsuitable atmospheric conditions. Cold draughts and low night temperature are common causes. Overwatering and bad drainage may also account for some bud dropping. Plants should be given good cultivation, be kept out of draughts and, if under glass, low night temperatures should be avoided.

BUD STAGES Fruit growers use various

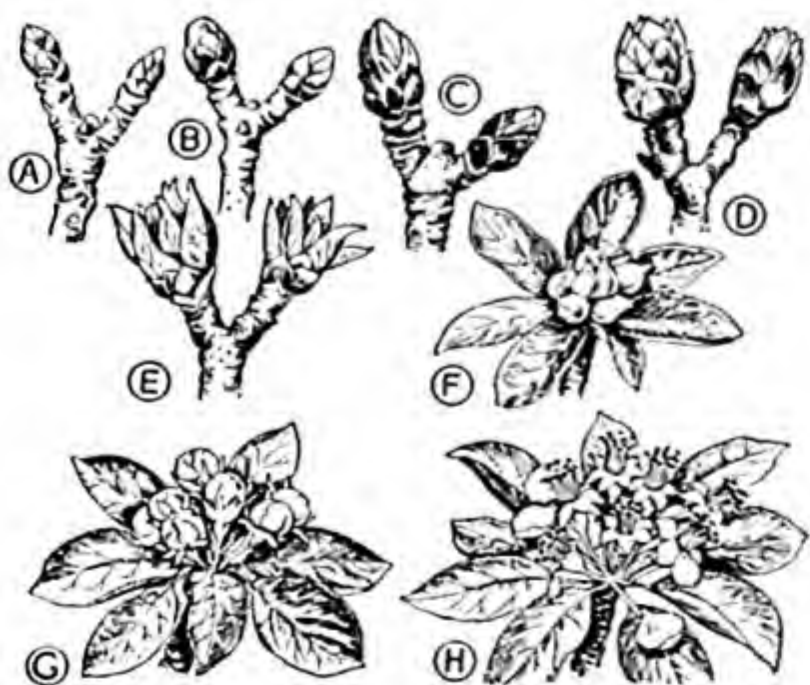
terms to describe the different stages of fruit tree growth in late winter and early spring. These are important because spray applications at these seasons are usually determined by the state of growth rather than by the precise calendar date. The terms commonly employed are (A) dormant, (B) swelling, (C) breaking or green tip, (D) bud burst, (E) mouse ear, (F) green bud or green cluster, (G) pink bud, or white bud, (H) full blossom and blossom fall (see diagram). With plums the term cot split is also used. They may be described as follows: Dormant—the stage at which the blossom buds are, to all outward appearance, quite inactive, a period roughly extending from November to the end of January. Swelling—a condition following the dormant stage when the buds are rapidly increasing in size and the scales enclosing the buds are starting to loosen. Breaking or green tip—the tips of the green floral leaves within the bud begin to protrude through the loosened scales at the end of the bud. Bud burst—the leaf tips are beginning to separate. Mouse-ear—the stage at which the individual floral leaves become apparent as they unfold themselves from the buds and the tips of the green blossom buds can be seen. Green cluster or green bud—the scales have now completely dropped off and the cluster of tight green flower buds is revealed in the centre of a rosette of floral leaves. Pink or white bud—at this stage the flower buds have expanded sufficiently to reveal a trace of petal colour,

pink with apples, white with pears and plums. Full blossom—the stage at which 80–90 per cent of the blossom is fully open. Blossom fall—the stage at which 80–90 per cent of the blossom has fallen. Cot split—the yellow calyx splits away from the tiny fruitlets of the plum about a week after petal fall.

BUG A member of the order *Hemiptera*, which consists of insects with biting-and-sucking mouthparts, and contains, apart from species of direct interest to the gardener, such well-known characters as the bed-bug, water-boatmen or pond-skaters, and the frog-hopper or cuckoo-spit insect. The great majority of the 1500 British species are sap-suckers, which makes the order one of very great importance in horticulture. It includes for example, the capsid bug (*q.v.*) and also many species of aphids, popularly known as greenfly, white fly, black fly and plant lice. Mealy bug on vines and greenhouse plants generally is also included and so are the various scale insects which attach themselves like limpets to the bark, stems or leaves of plants, sucking their juices. Lastly there is the rhododendron bug, a small black creature which attacks rhododendron leaves, giving them a rusty appearance beneath and a mottled look above. All these insects are detailed under their particular names.

BULB A bulb may be regarded as a much modified bud. It is a storage organ, usually formed underground, with fleshy scales or swollen leaf bases which serve to store food for a resting period. A typical example of a true bulb is an onion and if this is cut in half, the separate leaf bases of which it is formed can be seen very readily. In the centre of the bulb is an embryo shoot, as in the case of an ordinary bud, and often there is also a complete embryo flower.

However, the term 'bulb' is often used loosely in the garden to cover all kinds of fleshy growths which store food and have the power of growing into new plants. Thus a 'bulb catalogue' is likely to contain descriptions of plants with tuberous roots or



Fruit bud stages

which form corms, besides plants which form true bulbs.

Many totally different kinds of plants form bulbs and it often happens that within one genus of plants, some members are bulb-forming whilst others are not, e.g. in the iris family there are various species, such as *Iris reticulata* and the Spanish, English and Dutch irises which form true bulbs, others such as the so-called German or flag iris which form rhizomes (fleshy stems formed on or near the surface of the soil) and yet others, such as *Iris unguicularis* and *I. sibirica* which are fibrous-rooted without bulbs, rhizomes or other methods of storing large quantities of food. Some bulbs are hardy, some are half-hardy and others are tender. Some have a long resting period and others practically no resting period at all.

During the so-called resting period, the bulb is seldom completely dormant as important physiological changes may be going on within it, preparing it for its next season of growth. It is sometimes possible, by special treatment, to hasten or alter these changes, a fact that has been exploited by gardeners in the so-called vernalization of hyacinths, tulips and daffodils. These vernalized bulbs are treated to periods of carefully regulated temperatures as a result of which they grow much more rapidly than untreated bulbs and can be used to produce very early supplies of flowers.

Most bulbs form offsets or small bulbs around themselves and sometimes the parent bulb itself will split into two or three separate and smaller bulbs. These offsets and divided bulbs can be detached and used to increase stock and the usual time for doing this is when growth dies down and the bulb becomes dormant. In a few instances, new bulbs can also be formed from separate bulb scales, a system of propagation often used in the case of lilies. The scales of fully developed bulbs are carefully detached and laid in moist sand, peat or leaf mould, sometimes in an unheated frame or greenhouse and sometimes in a steam-warmed room with a very humid atmosphere. After a few months, small bulbs are formed at the bases of the scales



Different types of bulbs

and these can be treated thereafter like normal offsets.

BULB FIBRE Where bulbs are grown for indoor decoration in ornamental bowls which are unprovided with drainage holes, these receptacles cannot be filled with ordinary soil or soil compost as this would soon become sour due to the lack of drainage. In consequence a special compost is used which is often described as bulb fibre. It may either be purchased ready for use or it can be prepared at home from the following ingredients.

6 parts by loose bulk of peat.

2 parts of oyster shell.

1 part of crushed charcoal.

Mix well and moisten very thoroughly before use.

BULBIL The very small bulbs which form on some plants and which, if detached and planted in suitable soil and situation,

will, in time, grow into full size bulbs. The tiger lily (*Lilium tigrinum*) is a familiar example of a plant that forms bulbils on the flowering stems, in the axils of the leaves.

BULLATE A botanical term meaning puckered or blistered in appearance. It is sometimes applied to leaves which have a naturally irregular surface, e.g. *Rhododendron bullatum*.

BUNCH Any collection of flowers tied together, or fruits in a natural cluster, as for example a bunch of grapes. The term is occasionally used in show schedules, for example there may be a class for a 'bunch of garden flowers'. If this is not qualified in any other way, it may be taken to be any number of flowers of any kind, tied together by their stems to form a bunch of any size. It is in consequence, a bad description without some qualification such as the number of stems which may be included, the total size of the bunch or something of that kind. Occasionally, small vegetables such as shorthorn carrots and spring onions are also asked for in show schedules, 'bunched'. This means they should be tied together by their stems.

BURGUNDY MIXTURE A very useful preparation for the curing or prevention of diseases caused by fungi. It is closely allied to Bordeaux mixture and gets its name from the fact that it was first developed in the Burgundy district of France for use on vines. Like Bordeaux mixture, it makes use of copper sulphate, but the acidity of this is neutralized by washing soda instead of lime. The formula is :

8 oz. copper sulphate.

10 oz. washing soda.

5 gals. of water.

Dissolve the copper sulphate in 4 gallons of water and the washing soda in the other gallon. Pour the washing soda solution into the copper sulphate solution, stirring well. Prepare in wooden or enamel vessels. Use at once.

BUSHEL This is a dry measure—an Imperial bushel consists of 8 gallons or 4 pecks and contains 1.28 cubic feet. Bushel

measures can be purchased, or a measure which will hold approximately a bushel (certainly close enough for ordinary garden purposes) can be made from a box measuring 10 × 10 × 22 inches. Bushel baskets are frequently used by market gardeners for conveying their produce to market. Another market container is known as the bushel flat, but this does not hold a bushel despite its name. It measures 21 × 16 × 10 inches. It should be noted clearly that a bushel is a measure of bulk and not of weight and that the weight contained in a bushel measure will depend on the substance being measured, e.g. a bushel of basic slag will weigh much more than a bushel of sand which will in turn weigh much more than a bushel of dry peat.

BUTTERFLIES Most butterflies are harmless as far as the gardener is concerned, and some are actually beneficial as they help to carry pollen from flower to flower and so effect fertilization. There are, however, some exceptions to this general rule, notable among them the white butterflies, both large and small. The bright green caterpillars of these familiar creamy-white butterflies attack not only cabbages but all



Life-history of the cabbage white butterfly

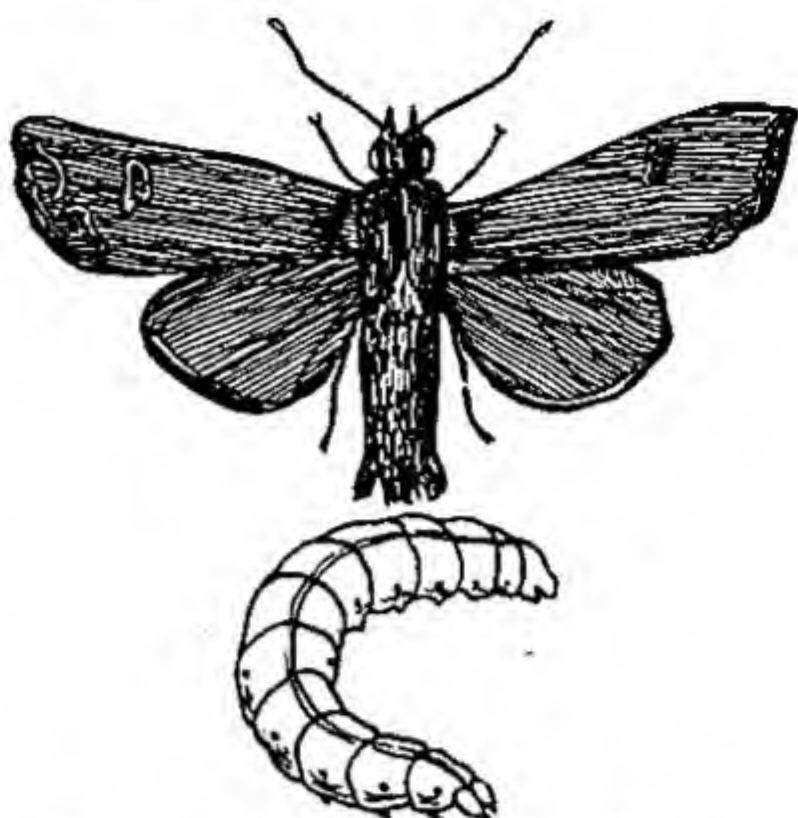
kinds of brassicas and many other plants as well. They eat holes in the leaves and are capable of defoliating plants completely. The best remedy is to spray or dust directly an attack is observed with a good insecticide such as derris or DDT. On a small scale hand-picking will be found of service.

CABBAGE APHIS One of the many species of aphid. It attacks cabbages and allied brassicas. For treatment see *Aphis*.

CABBAGE BUTTERFLY, see *Butterflies*.

CABBAGE DOWNY MILDEW A disease which sometimes attacks cabbages and other brassicas, particularly in the early stages of growth. The leaves turn yellow and develop a grey downy mould on their undersides. Considerable damage may be done, particularly in wet weather in overcrowded beds. The best preventive is to give plants plenty of room at the outset and to spray with Bordeaux mixture if the disease is observed in the locality.

CABBAGE GALL WEEVIL The adult weevil is a small beetle-like insect which does not itself damage plants, but it produces eggs which hatch out into small white grubs that attack cabbages and other brassicas, including turnips, at or near soil level, causing them to develop galls. Plants that are attacked can be recognized by these galls or lumps, each about the size of a pea, clustered around the base of the stem or the upper part of the main root. Sometimes these swellings are mistaken for those caused by club root disease, but they can be distinguished by the fact that the club root swellings are on the roots themselves, including subsidiary roots, whereas the galls are only on the stem and that portion of the root which is a continuation of the stem. Moreover if one of these galls is broken open, it will be found to be hollow within and most likely the small white grub which has caused the damage will be found in this hollow. The galls are unsightly but appear to inflict little damage on the plant. In serious outbreaks it may be desirable to dress the soil with a soil insecticide containing gamma-BHC or DDT, but in most instances it is sufficient to break open the

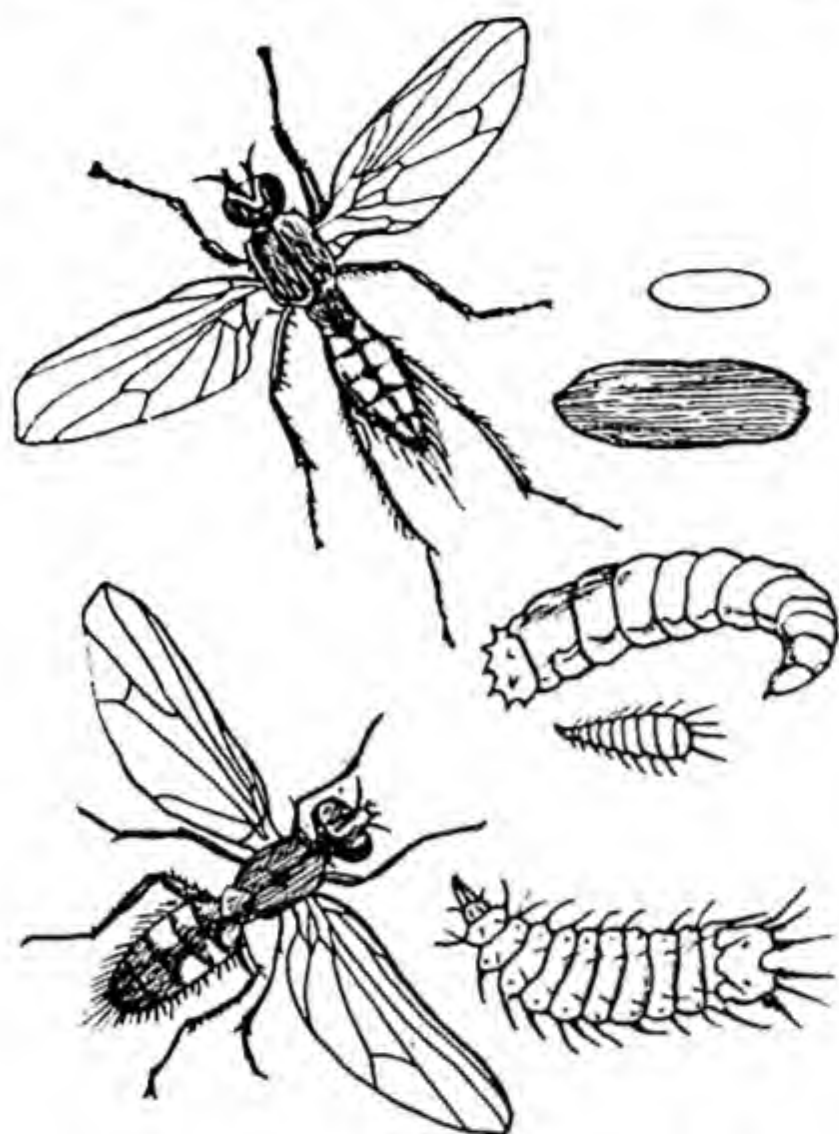


The caterpillar and adult insect of the cabbage moth

galls and destroy the larvae when transplanting brassica seedlings.

CABBAGE MOTH The caterpillars of this greyish moth attack cabbages and all kinds of brassica as well as some other plants. These caterpillars are sometimes confused with the caterpillars of cabbage white butterflies. They may be distinguished by the fact that though they are greenish when very young, they soon change to a dull, olive green or brownish colour or at most a dirty brownish green, and are not bright green throughout, like the caterpillars of the cabbage butterfly. In any case accurate identification is not important from the gardener's standpoint as the remedy for both cabbage white butterfly and cabbage moth attack is the same, namely hand-picking and dusting or spraying with a good insecticide such as derris or DDT.

CABBAGE ROOT FLY This insect pest, which in appearance is rather like a small housefly, lays its eggs in the soil near the roots of cabbages and allied plants. These eggs soon hatch out into small white maggots which feed on the roots. In severe cases the plants are killed outright, and even when this does not occur they are severely checked and often become blind.



Two species of cabbage root fly

Most of the damage occurs during May and June, though successive broods may be produced throughout the summer. One of the most effective preventives is to sprinkle 4 per cent. calomel dust on the surface of the

soil close to the base of plants likely to be attacked. This may be done to brassica seedlings in the seed rows, and also to the same seedlings after they have been planted out. An inch-wide band of calomel dust round every plant or on each side of the seedling row will be sufficient to give protection. An alternative is to water the soil in the seed beds and around newly planted brassicas with a solution of mercuric chloride, at 1 ounce to 6 gallons of water. The drawback to this treatment is that mercuric chloride is a deadly poison and must be handled with care. An old-fashioned preventive which is quite effective is to cut circular disks of tarred felt, each disk about 3 inches in diameter. A cut is then made to the centre of each disk so that it can be fitted around the stem of a brassica and pressed closely on to the surface of the soil. This prevents the female flies from laying their eggs near the base of the plant. Such disks should be placed in position as soon as the seedlings are planted out.

CABBAGE WHITE FLY A form of the white-fly so troublesome in greenhouses; attacks plants in the open and is particularly fond of cabbages and allied brassicas. See *White Fly*.

CACTUS A member of the natural order



Larvae of the cabbage root fly



A cactus in flower

Cactaceae. The term is often misused by gardeners to cover almost any kind of plant with fleshy leaves. The correct word to use in this general sense is 'succulent'. All cacti are succulents but not all succulents are cacti.

CALCAREOUS Containing chalk or lime. This term is applied in the garden principally to soils containing chalk or lime, which are sometimes referred to as calcareous soils. A calcareous rock is one composed mainly or entirely of chalk or limestone.

CALCIFUGE Disliking lime or chalk in any form. The term is frequently used to describe plants which are lime haters, e.g. most rhododendrons and heathers.

CALCIUM A chemical element which is an essential plant food. In soils calcium commonly occurs as calcium carbonate (chalk or limestone). See *Lime*.

CALCIUM CYANIDE A dry white powder which on exposure to the air gives off hydrocyanic acid gas. Both the powder itself and the gas are very poisonous and this chemical must be used with great care. It is employed in the garden as a fumigant in greenhouses to destroy white fly and other insects, and it is also used to gas rabbits, moles and rats in their runs.

To kill rabbits, moles and rats and to destroy wasps' nests, a teaspoonful of calcium cyanide is placed in each run or nest, which is immediately sealed with turf or soil. Special apparatus can be purchased for injecting calcium cyanide into rabbit runs. Whatever method is employed, great care must be taken not to inhale the fumes. For greenhouse use, see *Fumigation*.

CALLUS The growth which forms naturally over any wound made in a plant, e.g. if the limb of a tree is cut off, after a few weeks a thickening of the tissues underlying the bark will occur round the wound and this 'callus' will gradually extend until the whole wound is covered and new bark is formed over it. In a similar manner a cutting forms a callus at the base and this

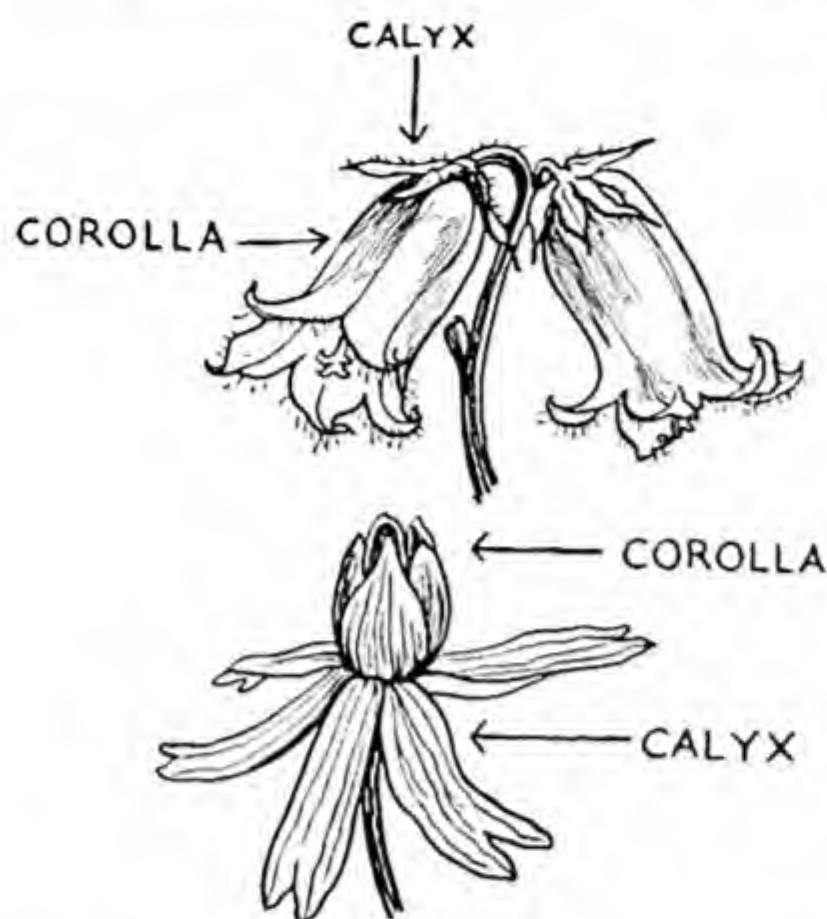


A callus forming on a tree trunk

callus in time covers and seals it. In this case roots may appear both from the callus and from the tissues immediately above it.

CALOMEL A popular name for mercurous chloride, a chemical used by the gardener to kill the maggots of the onion fly and cabbage root fly and also the fungus which causes club root disease. For both purposes, 4 per cent. calomel dust is employed and must be purchased as a proprietary article. To kill the fly maggots this powder is sprinkled in a narrow band around each cabbage or onion plant or in a narrow band along each side of every row of young plants. The most effective time to use it is in May and early June. For club root one teaspoonful of the powder is mixed with the soil in each hole prepared for a cabbage or other brassica seedling. If desired, the seed bed can also be sprinkled lightly with 4 per cent. calomel dust before seed is sown.

CALYX The outer whorl of a flower, formed of sepals, in contrast to the inner whorl formed of petals. These sepals are sometimes united in the form of a cup or tube and are sometimes separate. Frequently the calyx is green and not particularly conspicuous or decorative, but in some instances the calyx segments are more



Calyx and corolla

highly developed and more brightly coloured than the petals. This is notably the case with the many varieties of clematis, in which the showy part of the flower is formed of the calyx, and the petals are either completely absent or inconspicuous. Many of the highly developed garden forms of hydrangea also depend on large, coloured calyces (plural of calyx) for their decorative value. In lilies there is scarcely any differentiation between sepals and petals all of which play an equally conspicuous part in forming the flower.

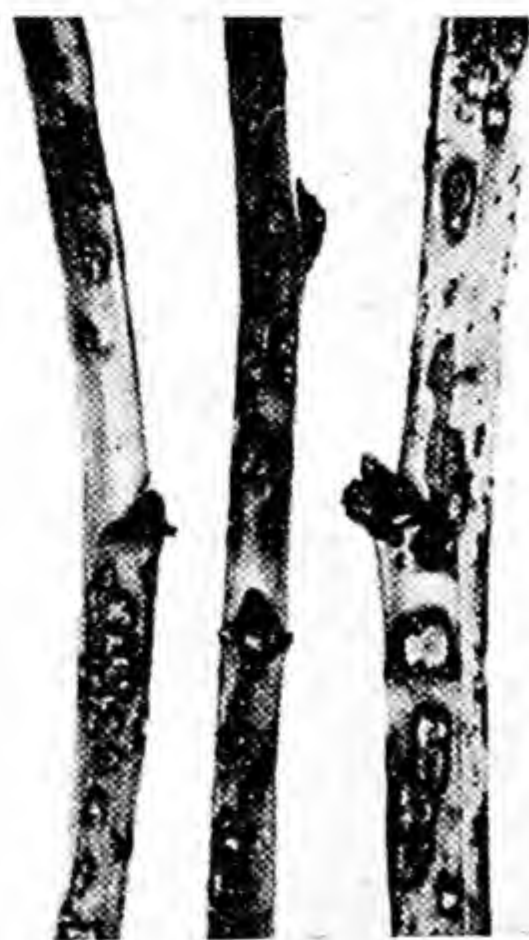
Carnation and pink growers have good cause to be familiar with the word, because the calyx of these flowers is tubular and often unable to contain the expanding petals which burst through it and so form a misshapen or irregular flower. This bursting is particularly troublesome with certain varieties. To overcome it carnation growers often place an elastic band round the calyx at an early stage.

CAMBIUM Botanically this name may be given to any plant tissue other than that at the growing points (shoot and root tips and buds) which retains the power of growth. However, when the term is used in horticulture it is almost invariably confined to the very narrow layer of active

tissue which exists between the bark and wood of dicotyledons. It is of vital importance to the grafter because it is at this point alone that active cell growth can take place, to unite stock and scion. When the bark is peeled from a young stem that is in active growth, part of the cambium adheres to the wood and part to the bark. It is this fact which makes it possible to 'bud' plants by placing a piece of bark carrying a bud in close contact with the 'wood' (it is actually the thin layer of cambium cells covering the wood) of a stock from which a small portion of bark has been peeled. When a cutting is inserted it forms a 'callus' from the exposed ring of active cambium and it is from the cambium and this callus that new roots (or, in the case of root cuttings, shoots) are formed.

CAMPANULATE Bell-shaped; a botanical term applied to flowers which are of this form. The genus *campanula*, to which the harebell belongs, gets its name from the fact that so many of its members have campanulate flowers.

CANE SPOT A familiar disease of raspberries, blackberries, loganberries and most other bramble fruits. It is caused by a fungus which attacks the canes. The first symp-



Cane spot disease

tom of attack is the appearance of purplish spots or patches on the young canes. These increase in size until eventually the bark itself splits and canker-like wounds are formed. As a result of this growth is weakened and the tops of the canes may even be killed. The most effective preventive is to spray with lime sulphur fungicide in March using it at twice the normal winter strength (22 fluid ounces of lime sulphur to 2 gallons of water). A further application of lime sulphur at double the normal summer strength (6 fluid ounces of lime sulphur to 2 gallons of water) may be given as soon as the first flowers open.

CANKER A general name given to various fungal diseases which attack the bark of plants causing this to decay and killing the vital cambium layer beneath. At first growth above the canker wound is merely checked, but later, if the wound spreads so that it completely encircles the branch, all that area above the canker is killed. Some varieties of apple are particularly susceptible to canker, caused in this instance by a fungus known scientifically as *Nectria galligena*. There are proprietary remedies on the market which will often cure canker



Canker on an apple branch

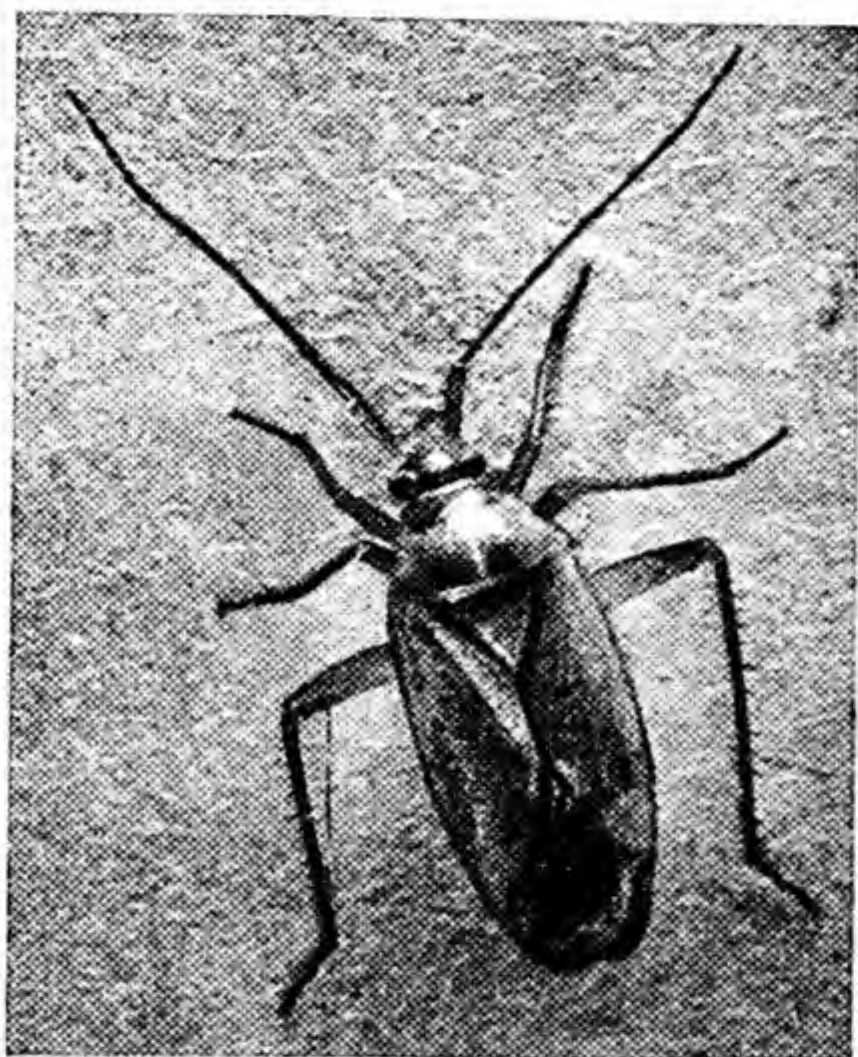
wounds and, if not, will usually prevent their spread. These should be used in accordance with manufacturer's directions. It is always wise to cut away the cankered bark and wood until clean healthy tissue is reached. This should be done with a sharp pruning knife and afterwards the clean wound should be painted with Stockholm tar or some other approved wound dressing.

The rose is also subject to attack by a fungus which causes canker, the scientific name in this instance being *Conothyrium Fuckelii*. The symptoms are very similar to those of apple canker though the fungus is entirely distinct and infection cannot spread from rose to apple or vice versa. The only effective remedy is to cut off and burn all affected shoots, making each cut well below the canker and into clean healthy tissue.

A stem disease of tomatoes is also known as canker. This is caused by the fungus *Didymella lycopersici*. It attacks the main stem turning it brown and causing it to shrink and decay. As a rule the point of attack is near the base of the stem. All affected plants should be removed and burned and the soil around neighbouring plants may be watered with Cheshunt compound to prevent infection. After the crop has been gathered the soil should be either changed completely or sterilized.

The name canker is also applied to a rusty decay of the upper part or 'shoulder' of the parsnip. In this instance it does not appear that the trouble is caused by a fungus and is not, in consequence, a true canker. The actual cause is somewhat obscure and may be physiological as the trouble is most apparent when parsnips are grown on very heavily manured ground. A useful preventive appears to be to dress the soil liberally with lime and sulphate of potash, prior to sowing parsnip seed. Hydrated lime is used at the rate of 8 ounces per square yard and sulphate of potash at 1 ounce per square yard.

CAPILLARY ATTRACTION The force which causes liquid to rise through any very fine tube or the tiny spaces between closely packed particles. It is capillary attraction which draws moisture



Capsid bug (enlarged)

through a sheet of blotting paper or oil up the wick of an oil lamp, and it is the same force which enables moisture to rise in the soil from the water reserves below. At one time it was supposed that hoeing was effective in preventing loss of moisture by evaporation from the surface because, by loosening the surface soil, the fine spaces through which water may rise by capillary attraction were broken up. Experiment has not supported this belief, for it has been shown that the loss of moisture by evaporation from unhoed soil is no greater than that from soil which has been hoed frequently. Apparently in this case the dried 'cap' of soil which forms on unhoed soil is as effective in preventing loss of moisture as the layer of broken soil.

CAPSID BUGS A group of insects some of which are plant pests though some are useful as they prey on other insects, notably red spider. The harmful capsids are whitish or greenish insects not unlike aphides. They obtain their food in a similar manner, mainly by sucking sap from the leaves, stems, fruits and flowers of plants. As a result the plants are weakened and there is usually considerable distortion and some-

times the formation of corky-looking scabs. This last symptom is common on apple fruits. Flower buds which are attacked by capsid bugs frequently fail to develop properly and may be one-sided, a deformity often noted in chrysanthemums. Relatively few capsid bugs appear able to cause a great amount of damage, no doubt partly because they are fairly active insects which pass readily from one part of a plant to another or from one plant to another. Capsid bugs can be killed by spraying with petroleum oil emulsion, nicotine or HETP.



Capsid bug damage

CAPSULE A dry fruit which splits to discharge its seeds and which has more than one carpel. Examples are the seed pods of the poppy, iris and cabbage.

CAPTAN A fungicide specially serviceable for controlling scab in apples and pears. It is also effective against black spot of roses. Unlike lime sulphur it has no ill effect on the leaves of any variety, but it needs to be renewed frequently to be fully effective. For scab control spraying every 10-14 days from May to August is recommended.

CARBON DISULPHIDE This is also known as Carbon bisulphide. It is an evil smelling, inflammable and volatile liquid which is used in the garden as a soil fumigant. (See *Fumigation*.)

CARPEL The female unit of a flower consisting of stigma, style and ovary. In



Carrot fly showing life stages and damage

many flowers there are several carpels either joined as in the tomato, or separate as in delphinium or peony.

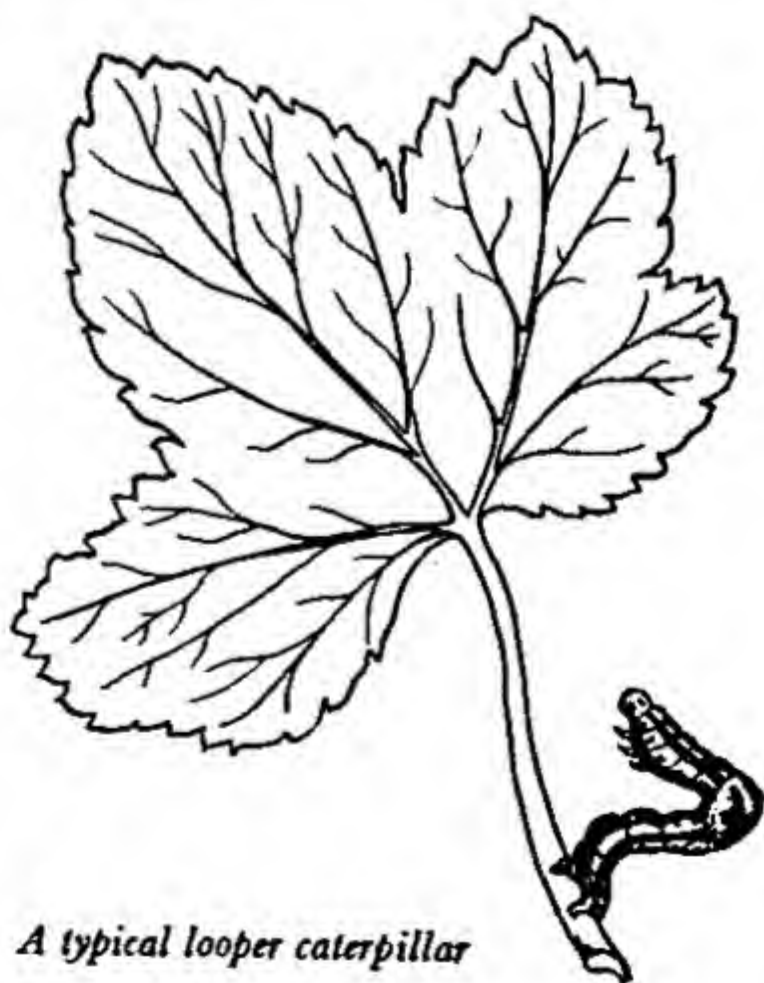
CARROT FLY A common pest of carrots. The adult fly is not unlike a small housefly and lays its eggs on the roots of carrots. It is particularly liable to choose plants growing in loose soil, as for example soil which has been disturbed by careless thinning of overcrowded seedlings. The eggs hatch out into white maggots which bore into the roots of the carrots. The attack usually commences in late April or early May, but successive broods may be produced throughout the summer. An old-fashioned remedy which is quite effective is to dust the surface soil every 10 days or so with finely powdered naphthalene, from about early May until the middle of July. The smell of this keeps the flies away. Careful thinning is an obvious precaution and the soil should be well firmed around any seedlings that are accidentally loosened. Various proprietary remedies are offered for this pest and should be used according to manufacturer's instructions.

CATCH CROP A crop grown rapidly on a piece of ground previously prepared for some other purpose, e.g. lettuces are

sometimes grown in the trenches prepared for celery before the celery is ready to be planted.

CATERPILLAR The larval stage of a butterfly or moth, the complete cycle being (1) egg, (2) caterpillar or larva, (3) pupa or cocoon, and (4) adult insect (butterfly or moth). There are, therefore, as many different kinds of caterpillars as there are butterflies and moths, but by no means all are garden pests. Nevertheless a considerable number of caterpillars, and particularly the caterpillars of moths, do feed on garden plants, and some inflict a great deal of loss on the gardener.

For the purpose of treatment caterpillars may be conveniently split into three groups—(1) those that feed on the outside aerial parts of the plant, mainly leaves, but occasionally shoots as well; (2) those that feed within the tissues of the plant either by tunnelling holes into the fruits as do the caterpillars of the codling moth, or by tunnelling into the shoots or branches, as do the caterpillars of the leopard moth and currant clear wing moth, and (3) those caterpillars that feed on the underground parts of the plant. Caterpillars of this third group are frequently referred to as cut-worms. They spend their lives in the soil and



A typical looper caterpillar

gnaw the roots or those parts of the stem which are at or beneath soil level.

Caterpillars which move by looping their bodies are known as loopers.

Leaf- and stem-eating caterpillars are usually dealt with by means of stomach poisons applied as sprays or dusts. Typical examples of such poisons are arsenate of lead, DDT, BHC and derris. The object is to cover the leaves and stems with a fine film of poison either just before an attack is likely to commence or as soon as one is observed. Then the caterpillars are poisoned directly they commence to feed.

Stem- and fruit-boring caterpillars are not so easy to deal with, in fact in the case of stem-borers it is usually necessary to extract them one by one from their tunnels with the aid of a length of flexible wire. Fruit borers may be killed with the aid of stomach poisons provided these are applied to the fruits before the caterpillars have entered them. This method is adopted to counter the attacks of the codling moth. (*q.v.*)

Cutworms or soil caterpillars may be dealt with by dusting the soil with a fumigant such as finely powdered naphthalene and hoeing this in, or by making use of poison baits, for which purpose Paris green and bran is one of the best. The recipe is $\frac{1}{4}$ pound Paris green, mixed with 7 pounds bran, a little water being added to make a crumbly mash. Small quantities of this are placed near the plants that are being attacked. Another method is to fork or hoe in specially prepared soil insecticides containing gamma-BHC.

CATKIN A particular kind of flower spike, usually unisexual and pendulous, in which the flowers are stalkless and have small, scale-like bracts. The hazel, birch and willow are familiar examples of catkin-bearing trees.

CAUSTIC ALKALI This is prepared with caustic soda dissolved in water and was once much used as a winter spray for fruit trees. It certainly cleared them of moss and lichen and probably killed some pests but, for this latter purpose, was far less effective than the tar oil and DNC winter washes which have now superseded it;



Hazel catkins

moreover caustic alkali was extremely unpleasant to apply and would burn clothes and flesh. The usual formula was as follows; 1 pound caustic soda 98 per cent. purity, 5 gallons of water. Dissolve the soda in one gallon of water, stirring occasionally, add the remaining water, stir well and apply at once as a coarse spray.

CELERY BLIGHT OR LEAF SPOT, see *Leaf Spot*.

CELERY FLY Also known as the celery leaf miner. The small white maggot of this fly tunnels the leaves of celery and, occasionally parsnips. As the grub feeds within the leaf it is well protected from ordinary application of insecticide. If the leaves are occasionally dusted with soot or are sprayed with paraffin emulsion it will prevent the female flies laying their eggs. Spraying with nicotine and soft soap insecticide will also help. In addition all old celery leaves should be burned and any leaves attacked by leaf-mining maggots should be picked off and burned.

CELL The unit of plant tissue, microscopic in size and consisting, as a rule, of a nucleus embedded in protoplasm and cell sap, and bounded by a thin wall. Cells at the tips of shoots and roots and in the cambium layer, have the power of multiplication by division, by which means the plant grows.

CENTIPEDE Yellow or orange coloured creatures with long, narrow bodies and many legs which may often be seen moving about very actively in the soil. They are friends of the gardener as they are entirely carnivorous and destroy many of the soil insects that harm his plants. Centipedes are sometimes mistaken for millepedes which are foes and not friends. They may at all times be distinguished by the fact that they are yellow or orange, whereas millepedes are blackish, grey or a dirty pinkish white; that they are very active whereas millepedes are rather slow in their movements; and that they have fewer and larger legs than millepedes.

CHAFERS A name given to various flying beetles of which the best known is the cockchafer. This usually flies at dusk, making a considerable droning noise and often colliding with obstacles. It is a large brown beetle with a black head and foreparts. These chafer beetles themselves eat leaves, flowers, etc., but even greater damage is done by their large, whitish and somewhat prawn-like larvae which may be found curled up in the soil. They are very slow in



Adult cockchafer



Larva of cockchafer

their movements, but nevertheless are capable of doing a great deal of damage by feeding on the roots and other subterranean parts of plants. They attack a great variety of plants including trees and shrubs. The beetles themselves may be killed by spraying the stems and leaves with arsenate of lead, DDT or some similar stomach poison. The larvae may be attacked with soil fumigants such as finely powdered naphthalene forked or raked into the soil, or carbon disulphide either injected into the soil with a special tool or poured into holes made with a dibber every 9 to 12 inches; such holes should be about 9 inches in depth and each should receive from one teaspoonful to a dessertspoonful of carbon disulphide. The holes should be refilled at once with soil to trap the fumes.

CHAIN A measurement of length used in surveying. A chain is 66 feet and a square piece of land with sides totalling this length is a square rod, pole or perch.

CHALCID WASP, see *Predators*.

CHALK Chalk, which is one of the common geological formations in this country, is carbonate of lime—(otherwise known as calcium carbonate) and is chemically identical with limestone, though it is much softer. Chalk is converted into quicklime by burning it in kilns, and quicklime in turn is converted into hydrated lime

by slaking it with water or by exposing it to a damp atmosphere. Chalk itself is valuable in the garden for correcting acidity, but it should be ground finely as, if applied in lumps, it is extremely slow in action, in fact the lumps may remain practically unchanged for many years. Some gardeners prefer finely ground chalk to hydrated lime on the ground that it is less liable to scorch tender leaves and roots, that it is pleasant to handle and that its effect is steadier and lasts longer. It is also said to be better for light, sandy soils because of its tendency to hold moisture and therefore to correct the natural dryness of these soils. It can be employed in potting composts in place of ground limestone and is in fact one of the recognised ingredients of the John Innes seed and potting composts. For this purpose it is usually applied at the rate of 3 ounces chalk per bushel of compost. In the open garden, it is used at rates varying from 6 ounces to 2 pounds per square yard according to requirements. It can be applied at any time in the year but should not be used at the same time as dung or sulphate of ammonia, with either of which it will combine to liberate ammonia gas with resultant loss of nitrogen.

Gardens on chalky soils present their own problems as the soil is likely to be alkaline and therefore unsuitable for the cultivation of acid-loving plants such as rhododendrons and heathers. Moreover, an excess of chalk or in fact an excess of any form of calcium, may result in the locking up of certain other essential plant foods, notably iron, magnesium and potassium. It is because of this lack of available iron and magnesium on chalk soils that plants growing in such places often have yellow foliage—a condition known as chlorosis and due to lack of chlorophyll or green colouring matter. Iron and magnesium are both essential ingredients of chlorophyll. It is not possible to overcome these deficiencies solely by adding iron to magnesium without correcting, in some way, the excess of calcium. This may be done by giving heavy dressings of acid substances such as dung, peat and oak leafmould. Chalky soils tend to be very wasteful of humus and consequently high rates of manuring with bulky manures

such as dung and compost are likely to be required to maintain full fertility.

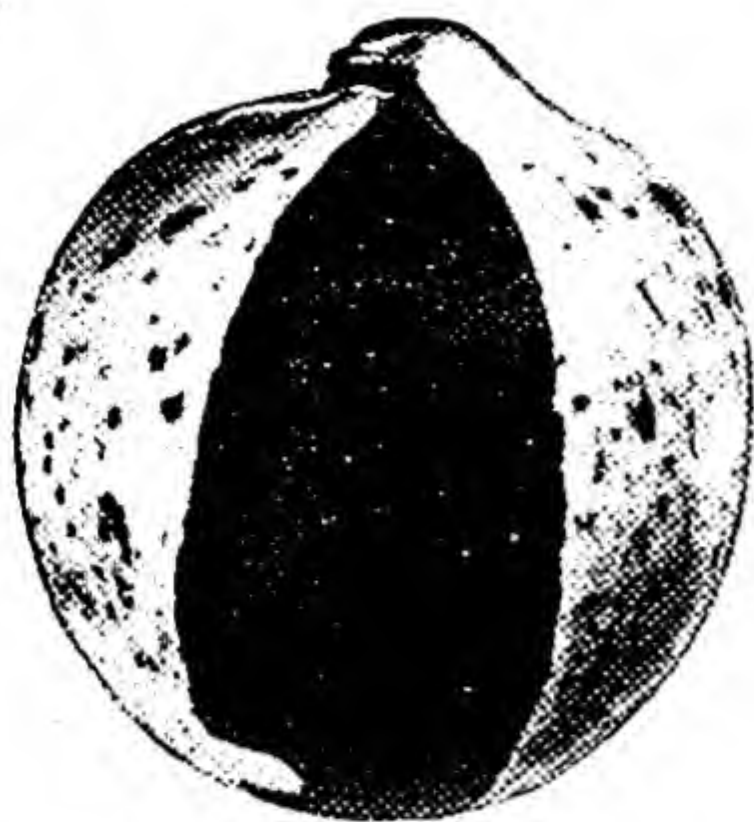
Plants which thrive in chalky soils include aubrieta, most members of the dianthus family including the pink and border carnation, and gypsophila.

CHARCOAL This is produced by burning or smouldering wood in a heated cylinder or covered fire with a very limited air supply. Powdered or crushed charcoal is useful in the garden because of its power of absorbing poisonous substances. It may be used in potting composts to keep them sweet and is an important ingredient of the special bulb fibre (*q.v.*) used when bulbs are grown in undrained bowls or pans. It has little or no value as a plant food and is too expensive for use in the open ground.

CHESHUNT COMPOUND A mixture used to check the spread of damping-off disease and other soil-borne fungus diseases, particularly those that attack the stems of plants at or near soil level. Cheshunt compound is made by mixing 2 parts by weight of finely ground copper sulphate with 11 parts by weight of fresh ammonium carbonate. This mixture must be stored in a stoppered glass jar for at least 24 hours, after which it can be kept for any reasonable time. It is prepared for use by dissolving 1 ounce of the mixture in a little hot water and making up to two gallons with cold water. This solution is sprinkled on seedlings and soil from an ordinary watering can fitted with a fine rose, and must be used as soon as prepared.

CHIMAERA In most plants the living tissues throughout are of the same genetical character, i.e. if any portion of a plant is separated and induced to form a new plant it will have exactly the same characteristics as the parent. However, there are exceptions to this general rule of uniformity and many plants are known in which tissues of two or more kinds exist side by side, each maintaining its separate identity. Such plants are known as chimaeras.

There are several different kinds of chimaeras differentiated according to the manner in which one kind of tissue is associated



An apple chimaera

with the other. In some the outer covering or 'skin' is of one character and the inner tissues of another. A familiar example of this kind of chimaera is the potato Golden Wonder which has a russet skin. This russet skin is of a different genetical character from the cells composing the flesh of the potato, a fact which can be demonstrated by raising plants from buds or eyes induced to form from the flesh. Such plants will produce smooth-skinned potatoes which are identical in every respect with the old variety Langworthy; in fact, Golden Wonder is merely Langworthy with a skin of a different character. Variegation in some plants is caused by a similar phenomenon; for example, there are pelargoniums in which a colourless or nearly colourless epidermis (skin) overlies tissues of the normal green character. Where colourless skin overlies green tissue it is not observed; the leaf has a normal green colour, but the edge of the leaf is formed from the epidermis only and is therefore, white. The epidermis does not exist on the roots of a plant and so new plants of this kind of pelargonium, raised from root cuttings, are of the normal green-leaved type without a white margin. The opposite kind of variegation also occurs, namely a green skin overlying colourless cells. With this the reverse result will be obtained if plants

are raised from root cuttings, i.e. the plants will be completely devoid of green colouring matter and will soon die.

In another type of chimaera one kind of tissue lies alongside the other and does not fit over it like a glove.

Chimaeras may occur naturally through a change in the genetical characteristics of one or more growing cells, or they may sometimes be produced by grafting. One of the best-known graft-chimaeras is *Laburnocytisus Adamii*. This was produced by grafting common laburnum on *Cytisus purpureus*. Instead of the tissue of stock and scion remaining entirely separate, one supplying the roots and the other the aerial parts of the tree, they become mixed though each retains its separate identity. As a result *Laburnocytisus Adamii* produces normal laburnum growth and also broom-like growth. This latter produces the typical purplish flowers of *Cytisus purpureus* while the laburnum growth will bear not only normal yellow laburnum flowers, but also other flowers similar to the laburnum in form, but of a purplish colour. All three characters may be observed at random throughout the aerial parts of the tree, which thus presents a very odd appearance.

CHLORBENSIDE (CHLORPARA-CIDE), see *Red Spider*.

CHLOROPHYLL The green colouring matter of plants which is particularly developed in the leaves. Chlorophyll is a highly complex substance, which has the unique property of being able to utilise sunlight for the purpose of synthesizing the complex chemicals upon which plants live from simple chemicals supplied from the soil and air. This process is known as photosynthesis. Plants with white or yellow leaves lack chlorophyll, and are unable to carry out photosynthesis. Lack of chlorophyll may be brought about by many causes including the action of viruses or inherited genes and the lack of certain chemicals in the soil such as iron and magnesium. Shortage of colouring matter in the leaves is often associated with high calcium content in the soil, as in very chalky soils. This is due not to the direct action of the chalk on the plant, but to the fact that in the presence

of so much calcium, iron and magnesium are locked up and become unavailable to the plant.

CHLOROSIS Loss of chlorophyll or green colouring matter in a leaf or leaves as a result of which they become yellow or



Chlorosis in strawberry leaves

white. As it is the chlorophyll which enables the plant to manufacture its food from raw materials obtained from air and soil, it follows that without chlorophyll the plant will become starved and may in severe cases be killed. Chlorosis may be a symptom of disease, notably of certain virus diseases, but in such cases it is more usually referred to as mosaic, the term chlorosis being reserved for yellowing caused by purely physiological conditions. Two of the commonest causes are lack of iron and lack of magnesium. Lack of iron is itself usually due to excessive alkalinity and cannot be countered directly by applying iron salts to the soil, as this iron is rapidly rendered unavailable. Spraying the foliage with a solution of sulphate of iron in water at $\frac{1}{2}$ ounce per gallon, will sometimes effect an improvement, but in the case of trees a more certain measure is to inject tablets of sulphate of iron into holes drilled in the wood. Great care must be taken to keep the sulphate of iron out of direct contact with the cambium layer or bark of the tree. Improvement may also be effected by making the soil more acid, which can be done by giving dressings of dung, peat or leaf mould. It is possible that soil applications of sulphur or alum may produce a similar result. Chlorosis caused by lack of magnesium can usually be cured quite readily by dressing

the soil either with sulphate of magnesium (Epsom salt) at approximately 1 ounce per square yard, or with magnesium limestone at rates from 4 to 8 ounces per square yard.

CHOCOLATE SPOT A familiar disease of broad beans, resulting in the production of chocolate-coloured spots on the leaves. These spots may increase rapidly in size until the whole plant presents a withered appearance. The disease is caused by the same fungus as that which produces grey mould. It is most likely to be severe in spring following very cold or wet weather. The best preventive is to give early sowings of beans a rather sheltered position, or to protect them with cloches. Good cultivation, and in particular the provision of ample potassic and phosphatic food in the soil, will also help to prevent this disease occurring.

CHROMOSOME The rod-like bodies found in all living cells and containing the numerous genes which control the development of the plant. As the cells divide the chromosomes also divide so that the number in each cell remains constant. When the sex cells are formed a special kind of division occurs which results in each such cell having half the usual number of chromosomes. When two sex cells meet and fuse, each contributes its half complement of chromosomes so that the original number is re-



Chlorosis in a camellia leaf



Chocolate spot of broad bean

stored. It is by this means that each parent contributes its share to the heredity of the offspring. Every species of plant has its characteristic basic number of chromosomes. Sometimes this number is altered by natural accidents in division or by irregular division brought about by chemical or other means. Plants with abnormal numbers of chromosomes are known as polyploids and often look different from the normal or diploid plants. Sometimes the polyploids are bigger and more valuable for garden purposes.

CHRYsalis A stage in the life of an insect between the larva (caterpillar or grub) and the perfect insect (or imago: butterfly, moth, fly, etc.) Another name for chrysalis is pupa. It is a stage of relative inactivity when outwardly there is little sign of life or movement though, within the chrysalis, important changes are taking place.

CILIATE Fringed with hairs; a botanical term applied mostly to leaves which have margins of this character, as in *Rhododendron ciliatum*.

CLADODE A stem which has taken on the function of a leaf. A well-known example is the apparent 'leaf' of the common Butcher's Broom (*Ruscus aculeatus*), which is

not really a leaf at all but a flattened stem. It can be observed that the small white flowers are borne in the centres of these 'leaves' which proclaims their true character as stems.

CLAMP A method of storing potatoes and some other tender roots in the open so that they are protected from frost and rain. A clamp consists of a conical or ridge-like heap of the roots to be stored, covered with a thick layer of clean straw which is itself covered with soil beaten smooth. As a rule, ventilating shafts are made at intervals along the ridge or at the apex of the cone by pulling wisps of straw through the soil covering. These 'chimneys' allow damp, warm air to escape from the interior of the clamp.

There are several points to observe when making a clamp. First of all it should stand on well-drained ground or, if this is not possible, a trench should be dug right round the proposed site of the clamp and the soil so excavated should be used to build up a platform on which the clamp can stand. Next a good thick layer of straw or twigs should be placed on the ground before any roots are put into position. The covering layer of straw over the roots



Cladode



A typical potato clamp

should be at least 1 foot thick and the outer covering of soil should be at least 9 inches thick, beaten down smoothly with the back of a spade. Clamps may be of any convenient size but the sides should be as steep as possible. Convenient dimensions for a ridge-shaped clamp are 4 to 5 feet through at the base and 3 to 4 feet high at the ridge.

Though clamps are principally used in gardens for potatoes, it is by no means their only use. Dahlia tubers can be stored successfully in clamps; beetroots are occasionally clamped and so are carrots, but with the last named a somewhat different method is usually employed. The roots are stacked, top ends outwards and are only just covered with sand or sifted ashes, no covering of straw or soil being used.

When clamps containing tender roots such as potatoes are opened to get at the contents, care must be taken to seal them up again properly or frosts may penetrate and do considerable damage. Care should be taken to clamp only healthy roots as disease can spread very rapidly within a clamp.

CLASPING Botanists apply this term to leaves which partly or wholly surround the stem from which they grow.

CLASSIFICATION Classification of plants is a matter for botanists, but it is of interest to gardeners because they usually use the names which have been applied by botanists working to their classification rules. Popular names are used in some in-

stances, as for example for roses, wall-flowers, forget-me-nots, marigolds, lilac, but for many plants it is inconvenient to rely on popular names, either because no genuine names of this character exist (this will always occur with plants newly introduced from distant parts of the world) or because there are so many different species of plant all bearing the same popular name that confusion would occur. A good example of this is the barberry, of which there are now close on 200 species in cultivation, any of which can be referred to as a barberry. In order to make it quite clear which species is being referred to, it is almost essential to make use of botanical nomenclature.

This nomenclature is based upon scientific examination of the plants in an effort to trace their relationship one to another—a kind of family tree. The system of nomenclature is governed by international rules which are respected in every country throughout the world, and so the correct botanical name of any particular plant in one country will be equally valid in any other country. In this way the gardener as well as botanist has an international language at his disposal, by which he may communicate with gardeners in other lands and if he desires, purchase plants from



Clasping leaves

abroad with the certainty that he will make his requirements quite plain.

The primary classification of plants is into those which flower and which are botanically called phanerogams, and those which do not flower and are called cryptogams. Ferns and fungi are familiar examples of non-flowering plants.

Flowering plants are obviously of greater importance to the gardener, and these are again subdivided into two great groups, according to the method of carrying their seeds. In one group, known as gymnosperms, the ovule or female cell, which, when fertilized, will develop into a seed, is exposed, whereas in the other class, known as angiosperms, the ovule is protected in an ovary. Pines, firs, cedars and other cone-bearing trees are familiar examples of gymnosperms, while apples, roses, tomatoes and peas are angiosperms.

The angiosperms are themselves subdivided into two classes according to the number of seed leaves or cotyledons which they produce when the seed germinates. One class is known as monocotyledon because its members only have one seed leaf—the onion and the lily are examples known to everyone. The other class is known as dicotyledon because normally its members produce two seed leaves—tomatoes and the marigold are of this type.

Within these major divisions of the vegetable kingdom the individuals are grouped according to their families, genera, species and varieties. From the gardener's point of view, it is the last three which are of most importance, but it is desirable to have some understanding of the whole system as this will enable him to understand the relationship between his plants more intelligently.

The species is the unit and all plants within the species will resemble each other closely, only differing in minor qualities such as colour, size of flower, earliness and so on. Species which resemble one another fairly closely and may be considered to have some common ancestry, are grouped together in genera, and genus and species between them provide the botanist with his mechanism for nomenclature, known as the binominal system. By this, each plant receives two names, the first designating

the genus to which it belongs and the second the species. Thus *Ranunculus* is the generic name of the various species of buttercup, of which there are many. The common creeping buttercup is known as *Ranunculus repens*; the meadow buttercup, which is more erect in habit, and does not creep about to the same extent, is *Ranunculus acris*, and the marsh buttercup, *Ranunculus Lingua*. Exactly the same principle applies to garden plants—the barberries all belong to the genus *Berberis*, but each separate species has its own name so that the common barberry found in this country is *Berberis vulgaris*, while the beautiful deciduous barberry found in China by the collector Wilson, is known as *Berberis Wilsonae*; the holly-leaved barberry which fills our gardens with orange blooms in April is *Berberis Darwinii*, and so on.

EXAMPLE OF CLASSIFICATION

Family	:	<i>Ranunculaceae</i>
Genus	:	<i>Delphinium</i>
Species	:	<i>Elatum</i>
Variety	:	<i>Bridesmaid</i>

Any small variation within the species may be indicated by varietal names; thus, *Berberis Thunbergii atropurpurea* is a form of Thunberg's barberry which has purple-coloured leaves. Sometimes varietal names are given as fancy or vernacular names. This is common with species or hybrids which are very variable and have been highly developed in gardens, as with roses and chrysanthemums. With these such names as *Etoile de Hollande*, *Crimson Glory*, *Shot Silk*, *The Favourite*, *Loveliness* and so on, are really varietal names in English form, and this is permitted by the international rules of nomenclature. Such names are referred to as horticultural names as distinct from true botanical names. It should be noted that names of genera and species can only be given after a plant has been properly examined and identified by a trained botanist and a full description published in a magazine or other publication accepted by botanists for this purpose. Horticultural names of gar-

den-raised varieties could, however, be given by gardeners who have no botanical qualifications, but rules are laid down, and among the most important of these is that no two plants of the same genus can bear the same varietal name, and all fancy names should be as simple as possible, and not include titles such as Mr., Mrs., Captain, etc. Horticultural names are only valid if published with a recognizable description in a recognized horticultural or botanical periodical or in a dated horticultural catalogue.

Genera are themselves grouped in families, according to their supposed relationship in the evolutionary scheme. Thus the buttercup already referred to, belongs to the family *Ranunculaceae*, a family which also includes the obviously allied marsh marigold or caltha, together with other plants not, to the layman, so obviously related, as for example columbine (*aquilegia*) aconitum, delphinium and love-in-a-mist (*nigella*).

CLAY Pure clay is a mixture of very fine sand with an intensely sticky substance known as alumina. It is useful for making bricks and pottery and also for lining ponds or bog gardens, but is no use in the garden as a medium for the culture of plants. What is loosely referred to as a clay soil, may be almost any mixture containing a proportion of clay together with coarser sand and humus. Clay soils themselves may be roughly classified as heavy and medium, the former containing a fairly high percentage of pure clay and the latter much larger proportions of coarse sand and/or humus.

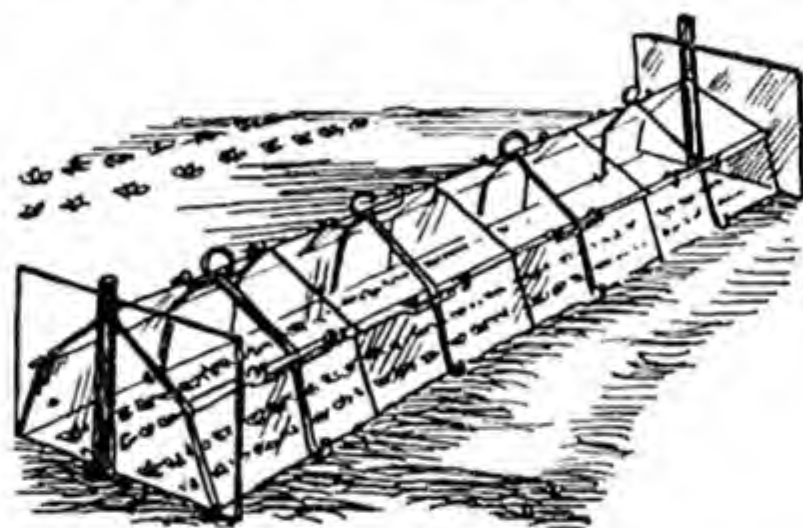
Clay soils in general are retentive of moisture and in consequence difficult to work in wet weather, but if they can be improved by drainage or by incorporating an opening matter, such as coarse sand and humus, they are usually very fertile. Moreover they hold what is put into them and in consequence are often more economical to cultivate than sandy soils through which water percolates so quickly that many foods are washed out almost as quickly as they are put in.

Lime exercises an important function in improving the texture of clay soil, see

Lime. Clay soils can be improved also by frequent digging, particularly when not too wet; by being left rough so that frosts and wind may break them up; by being left in ridges for the same purpose, and by being given heavy dressings of the lighter forms of dung such as stable manure or strawy farmyard manure and of such substances as peat, leaf mould, coarse sand and ashes. See also *Soil Conditioners*.

CLICK-BEETLE The popular name of the beetle, the larva of which is the wire-worm (q.v.).

CLOCHE Originally this term was applied to a small handlight or bell glass



A row of cloches

which could be quickly moved from one place to another and used for the protection of cuttings or seedlings or for the forcing of early vegetables. Nowadays, however, almost all cloches are of the continuous type, that is to say they are open-ended glass shelters which can be placed end to end to form a continuous line over a row, or rows, of plants. There are a great many different types, each with some peculiar advantage of its own. Great ingenuity has been shown in the production of these cloches and many of them are not only extremely rigid when fitted together, but can also be dismantled very rapidly so that they can be stored flat when not required.

Great ingenuity also has been shown in the working out of special systems of cultivation and rotations which will enable cloches to be employed to the best possible effect. One of the best and most commonly employed of these systems is that known as strip-cropping by which successional crops

are grown side by side in narrow strips, so arranged that directly crop number one requires no further protection, the cloches covering it can be moved one place to right or left to cover crop number two, and so on throughout the season.

The continuous type of cloche is not as serviceable as the old-time handlight or bell glass for the protection of cuttings, as it is not air-tight and cannot, in consequence, be used to maintain a very close atmosphere.

One difficulty that is likely to occur if cloches are used extensively without proper preparation, is in connection with watering. Either the cloches will have to be removed frequently so that water may be applied or the crops will become short of water. The skilled cloche gardener, overcomes this difficulty by using unusually heavy dressings of dung, peat, leaf mould or other spongy organic matter in the preparation of the soil which, in consequence, will retain large quantities of moisture without becoming waterlogged. When this kind of special soil preparation is coupled with overhead irrigation, little or no cloche moving is required.

CLONE All plants produced vegetatively from one original parent.

CLOVE This term is used by gardeners to describe the clusters of young bulbs which are produced by shallots and garlic. The word is also used for a particular type of very fragrant border carnation known as a clove-scented carnation or sometimes just as a 'clove'.



Cloves of garlic



CLUB ROOT A familiar disease of cabbages and other brassicas, caused by a fungus which exists in the soil and may attack the roots of these plants causing them to swell and eventually decay with a very unpleasant odour. Club root is most likely to be severe on rather acid soil and the fungus which causes it is unable to exist in soil that is markedly alkaline. In consequence the best method of preventing club root disease from appearing is to maintain the soil used for brassicas in a slightly alkaline condition by giving adequate dressings of lime. When the disease has become established liming will not, as a rule, produce an immediate cure though, if continued, it will eventually clear the soil. For a quick result, the soil in each planting hole should be dusted with 4 per cent. calomel dust or alternatively watered with a solution of mercuric chloride at 1 ounce to 10 gallons of water, $\frac{1}{2}$ pint of the solution in each hole. Seed beds may also be dusted with 4 per cent. calomel dust or watered freely with mercuric chloride solution before brassica seeds are sown. All plants that are attacked by club root should be lifted and burned, roots and all.

The damage caused by club root is often confused with that caused by the cabbage gall weevil. Points of difference to observe are that the club root swellings are always on the roots whereas the roundish lumps caused by the gall weevil are on the base

of the stem or that part of the root which is an extension of the stem, and that the club root swellings are solid throughout whereas the gall weevil lumps, if broken open, will be found to be hollow and quite likely to contain the small white maggot of the weevil.

CLUSTER CUPS A kind of rust disease which attacks gooseberries and occasionally red currants and black currants. A rather



Cluster cup of gooseberries

similar disease is also found on violas. The name refers to the orange or yellow blister-like swellings which appear on the leaves and, in gooseberries, also on fruits and occasionally young stems as well. Affected leaves or fruits should be picked off and burned and plants sprayed with Bordeaux mixture. As the fungus which causes gooseberry cluster cups can also be found on sedges, it is a good plan to drain bogs and other damp places in or near the garden.

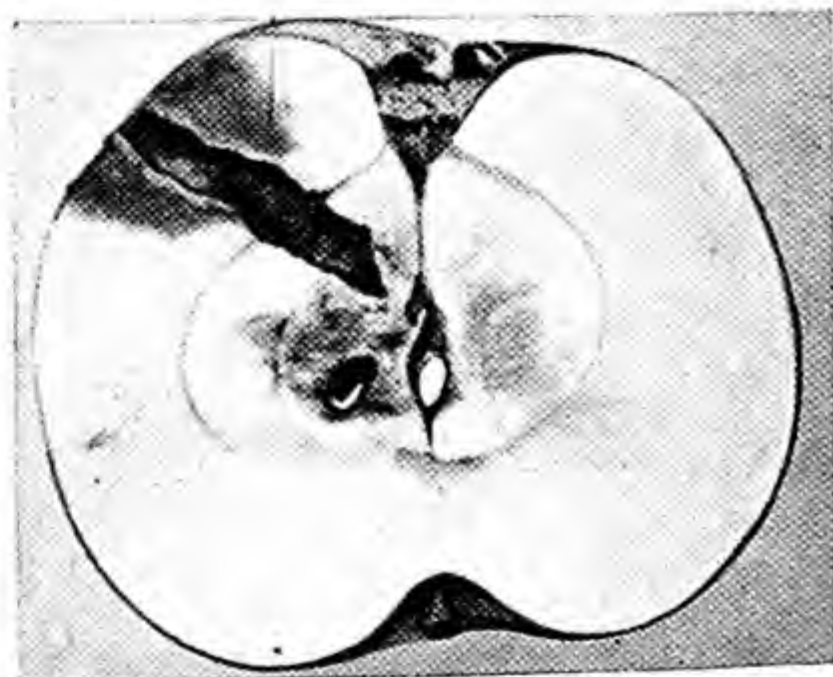
COCKCHAFER, see *Chafer*.

COCKROACH These flat black or dark grey beetle-like insects so common in old houses, may prove troublesome in the greenhouse for they eat seeds, seedlings and the young leaves and stems of plants. Proprietary cockroach traps may be purchased and should be used according to manufacturer's instructions. Cockroaches can also be trapped in jam jars sunk into the soil so that their rims are just level with the

surface and then half filled with beer or treacle diluted with water. Cockroaches can also be poisoned with Paris green and bran (see *Paris green*) or with powdered borax mixed with an equal bulk of castor sugar.

COCONUT FIBRE At one time this material, the outer fibre of coconuts, was freely employed in gardens as a plunging material, particularly in propagating frames. It has the merit of being highly absorbent, a good retainer of heat and more or less sterile. Unfortunately it has become scarce and its place has been taken to a large extent by peat.

CODLING MOTH This moth appears from June to August and lays its eggs on the young fruits of apple trees. From these eggs small white caterpillars hatch out and eat their way into the fruits, feeding on the flesh and producing a considerable cavity which may later become infected with the fungus causing brown rot disease. The damage caused by codling moth caterpillar is very similar to that caused by the larva of the apple sawfly, but the two may be distinguished by the fact that the sawfly attack usually starts in late May or early June and causes the fruits to fall while they are still immature whereas the codling moth attack starts about a month later and fruits may continue to develop to full size and ripeness despite the fact that there are caterpillars inside them. Moreover, an unpleasant smell is emitted from the holes produced by the sawfly larvae, but not



Damage caused by caterpillar of codling moth

from the holes produced by the codling moth caterpillars. A codling moth caterpillar has 8 legs whereas the sawfly larva has 10.

The best preventive is to spray with arsenate of lead in mid-June and if necessary, again in early July. Where attacks have been severe a precautionary spray may also be given in mid-May or, more exactly, as soon as the petals have fallen. Arsenate of lead is extremely poisonous and some gardeners will, therefore, prefer to use a less poisonous spray such as DDT. The drawback to this is that this spray tends to increase the red spider population of trees by killing off their natural enemies. If this occurs, it may be necessary to spray two or three times during June and July with derris, and, the following year, to give a preliminary spraying with DNC in early March.

COLCHICINE A very poisonous drug obtained from the colchicum and sometimes used in plant breeding. In very minute doses it has the effect of producing abnormal growth, occasionally growths with more than the normal number of chromosomes. Some tetraploids have been artificially produced by colchicine treatment. The method usually employed is to soak seeds for a few hours in a dilute solution of colchicine. An alternative method is to treat buds that are just starting into growth. An overdose will kill the seedling of the plant and even when a correct dose is given there is no guarantee that any useful mutation will result. The concentration and dosage at which colchicine should be used varies from one species of plant to another, and only by experiment can the correct rates be ascertained. As an indication, however, seedlings of flax have responded to a 48-hour treatment in a 0.1 per cent solution of colchicine, while dwarf beans have responded to a 2-hour treatment in a 0.5 per cent solution.

COLLAR ROT A general name given to various diseases which attack plants at the 'collar', i.e. the point where stem joins roots. The damping-off disease which attacks seedlings is really a form of collar rot and, in fact, when the fungus which

causes damping-off attacks older plants it is referred to as collar rot and not as damping-off. These diseases are caused by soil-borne fungi and, in consequence, soil sterilization prior to planting or sowing provides a reasonable measure of protection. Such sterilization may be carried out either with heat or with a chemical such as formaldehyde (see *Sterilization*). As a rule once collar rot fungi have attacked a plant no remedy is possible, but the fungus can sometimes be prevented from spreading to other nearby plants by watering the soil around these with Cheshunt compound.

COLLOID A name given to a substance which is in a colloidal state, intermediate between a solution and a suspension. In a solution, e.g. of common salt (sodium chloride) in water, the salt is dissociated into sodium ions and chloride ions, which are kept in solution by electrochemical forces. In a suspension, e.g. of chalk (calcium carbonate) the particles are undissolved and eventually will settle, merely by force of gravity. In a colloid, the particles, although not dissociated, are so small that they remain in suspension. Colloids need not necessarily consist of a solid in a liquid. Glues and jellies are colloids (a liquid in a solid — 'colloid' is derived from a Greek word meaning 'glue'), so are smokes (a solid in a gas), 'aerosols' (a liquid in a gas), emulsion (a liquid in a liquid) and most coloured glass (a solid in a solid).

Much of the humus in the soil is present in this colloidal condition and it is in this state that it is most suitable as a medium for the growth of bacteria; in fact the provision of an adequate supply of colloids in the soil is an important element in maintaining soil fertility. Usually this is achieved by working in dung, leaf-mould, peat and other humus-forming substances, but various substitutes have been recommended including alginates obtained from seaweed.

Some insecticides and fungicides are prepared in colloidal form and it is claimed that because of their extremely fine texture they can be dispersed more evenly and will form a thinner, more continuous film on the surfaces of stems and leaves than

similar chemicals prepared in the form of powder or pastes.

COLLOIDAL COPPER A name given to certain proprietary preparations of copper used as fungicides. They have the merit of mixing very readily with water and producing a very thin and even film on the leaves or stems on to which they are sprayed. Colloidal copper can be used to control most of the diseases for which Bordeaux mixture is also applicable. Colloidal copper white oil emulsion is recommended for use against black spot disease of roses (*q.v.*).

COLLOIDAL SULPHUR A name given to certain proprietary preparations of sulphur, used as fungicides. They have the merit of mixing very readily with water and producing a very thin and even film of sulphur on leaves and stems. Colloidal sulphur may be used for most of the purposes for which lime sulphur is applicable. These include the control of apple and pear scab, mildews and red spider.

COLORADO BEETLE A serious pest of potatoes in many places but not firmly established in this country. The $\frac{1}{2}$ inch long beetle is yellow with black longitudinal stripes and the grub is reddish yellow. Both feed on the leaves of potatoes and are capable of stripping the plants. All cases of infestation should be reported to the Ministry of Agriculture.

COMPOSITE A member of the daisy family, in which many small individual flowers are united in one head. See *Compound Flower*.

COMPOST This word is used by gardeners in two quite distinct ways. A compost heap is a heap composed of garden refuse of one kind and another, such as grass clippings, soft hedge trimmings, vegetable leaves, etc., possibly with the addition of dung and straw which will rot down and provide suitable material for digging into the soil. Compost is also the term employed by the gardener for all kinds of soil mix-

tures used for rearing seedlings or growing pot plants.

Compost heaps are of many different kinds and many theories exist as to the way they should be treated. On two points, however, most gardeners appear to be in agreement; one that the compost heap should be reasonably well aerated, for if air is excluded undesirable organisms are likely to develop within the heap which may become sour and contain poisonous substances as a result. The other point agreed by all is that adequate, but not excessive moisture must be present.

In order to ensure proper aeration, the heap should not be too wide or high, though it can be of any convenient length. The usual recommendation is that heaps should not be more than 3 feet wide or 3 feet high when first built—they are likely to sink considerably as they rot. Some experts also like to make holes in the heap with a pointed stick after a few weeks to let in further air.

Decay is brought about by the action of fungi and bacteria and as the bacteria require abundant supplies of nitrogen as food, the rate of decay can, as a rule, be increased by supplying some readily available nitrogen. This may be done by sprinkling the refuse as it is placed on the heap with a nitrogenous fertilizer such as sulphate of ammonia or Nitro-chalk or by placing layers of rich, fresh, animal manure between the layers of garden refuse. There are



Making a compost heap in a box

a number of proprietary preparations on the market which have the same effect of accelerating decay. Some compost users believe that herbal extracts are valuable in assisting decay and keeping the compost sweet.

There is no doubt that acids are produced as by-products of even the most favourable decay and that too much acid will spoil compost. This danger can be avoided by including some lime in the heap, either by sprinkling alternate layers with powdered chalk or limestone or by using a fertilizer or dressing containing lime, such as Nitro-chalk. It should be noted that chalk or lime must not be brought into direct contact with sulphate of ammonia or ammonia will be liberated and nitrogen lost as ammonia gas.

Ordinary green refuse such as grass clippings and vegetable leaves, contain sufficient moisture, but dry refuse, such as bracken and straw, will need to be watered as it is built into the heap. Some experts like to turn their compost heaps after a period of three weeks or a month and, when doing so, usually water any parts which appear dry. They also advocate that the outer portions of the heap should be turned inwards and the inside brought out.

Refuse of all kinds decays most readily and satisfactorily in a fairly warm temperature and damp atmosphere. In consequence, decay will be more rapid in spring and autumn than in winter and will also be rapid in summer if the heap is placed out of the direct rays of the sun which otherwise may dry it too much.

Some experts advocate the use of bins to hold the decaying refuse; these are certainly convenient and clean, but care must be taken to see that there is ample provision for aeration, which can be done by making the sides of the bin of slats or boards spaced a little apart.

If compost is exposed for long to rain, much of its nutrient value may be lost by leaching. In consequence if the compost has to be stored for any length of time, it is desirable that it should be kept in an open-sided shed or some similar kind of shelter.

Opinions differ as to precisely how long compost should be kept before it is in ideal



Making a compost heap in the open

condition for digging into the soil. Certainly it should be decayed to such an extent that the individual ingredients of which it is composed can no longer be distinguished. Some experts advise keeping it until it is a rich brown colour throughout, but others contend that by this stage there has usually been a considerable loss of plant food. It is probable that in warm weather, soft refuse will take at least one month to decay, but in winter, it may take 3 or 4 months. The harder the refuse, the slower the process of decay.

Soil composts for the cultivation of seedlings and pot plants were at one time of many diverse kinds as it was believed that quite different mixtures were required for plants of differing character of growth. Extensive research work carried out by the John Innes Horticultural Institution has shown that it is possible to accommodate practically all the plants commonly grown in gardens and greenhouses in a few standard mixtures.

The John Innes recommendations centre round three basic composts—one for seed, one for pot plants and one for cuttings. In all these mixtures, three ingredients figure prominently: loam which should be of good quality without free lime, but not too acid (pH 6.5 is ideal) and neither too heavy nor too light; peat, which must be fibrous or granular and reasonably free from fine dust, and sand which must be very coarse and sharp. The sand recommended by the Institute is obtained from Cornwall and ranges in particle-size up to $\frac{1}{4}$ inch. It is recommended that the loam, prior to use,

should always be sterilized, preferably by being steamed at a temperature of 200 degrees Fahrenheit for 20 minutes.

The seed mixture is prepared as follows :

- 2 parts by loose bulk of medium loam.
- 1 part by loose bulk of peat.
- 1 part by loose bulk of sand.

To each bushel of this mixture is added :

- 1½ oz. superphosphate of lime
and
- ¾ oz. either finely ground chalk or
finely ground limestone.

One of the unique features of the mixtures is the inclusion of fertilizers. Previous to the experimental work at John Innes Horticultural Institution, it was generally believed that fertilizers could not be used in seed mixtures without danger of injury to the tender roots of seedlings.

The loam used in this seed compost will probably have to be sieved but it is undesirable to use a sieve with too fine a mesh. One with a half-inch mesh will serve for most seed composts except those which are to be used for very small seeds such as those of meconopsis and begonias.

The standard Innes potting compost is prepared with :

- 7 parts by loose bulk loam.
- 3 parts peat.
- 2 parts sand.

Here again chemicals are added. A special mixture is prepared as follows :

- 2 parts by weight hoof and horn meal.
- 2 parts superphosphate of lime.
- 1 part sulphate of potash.

This is added to the compost at the rate of 4 ounces per bushel and in addition ¾ ounce of finely ground chalk or ground limestone per bushel is also added.

This standard mixture will suit almost all greenhouse plants. With some plants, particularly vigorous growing types which have progressed beyond the 4-inch pot. it has been found desirable to double the dose of fertilizers, 8 ounces instead of 4 ounces being used per bushel. For very sturdy plants grown in pots above 8 inches in diameter, a treble dose of fertilizer is used, namely 12 ounces per bushel. In all these

composts the dose of ground limestone or chalk remains the same, namely ¾ ounce per bushel. These three mixtures, one with a single or 4 ounce dose of fertilizer, one with a double or 8 ounce dose, and the third with a treble or 12 ounce dose, are often known respectively as John Innes Potting Composts, No. 1, No. 2, and No. 3.

When preparing loam for potting composts it is even more important than when preparing seed composts not to sieve finely; in fact when dealing with big plants in pots of 6 inch size or over, the sieve may usually be discarded altogether and the loam prepared simply by breaking it up with the fingers. Even when dealing with much smaller plants, a sieve with a ½-inch mesh will usually meet all requirements and the loam should be rubbed through the sieve so that as much as possible of the fibre passes into the potting compost. Finely sieved soils lacking in fibre, will bind badly.

The compost recommended by the John Innes Horticultural Institution as a rooting medium for cuttings, is composed of :

- 1 part by loose bulk of medium loam.
- 2 parts of peat.
- 1 part of coarse sand.

No fertilizers are added to this mixture.



*A compound
flower*

COMPOUND This term is used by botanists to describe leaves, flowers or fruits which are composed of two or more similar parts. Thus a rose has a compound leaf composed of several leaflets joined to a common stalk.

COMPOUND FLOWER A flower which consists of a number of separate florets united in one head as in the daisy family (*Compositae*) and also in the teasel family (*Dipsacae*).

CONE The clustered flowers or fruits of conifers. The flowers are unisexual and the female clusters develop into the typical scaly, and usually hard, cones which open to discharge the seeds they contain.

CONIFER Any tree which bears cones. Familiar examples are the various pines, spruces, firs and cedars.

CONSERVATORY A greenhouse attached to a building, usually a dwelling house, and forming a part of it. Conservatories were popular features of the larger Victorian houses and were often very extensive structures which provided an annexe to the drawing room or ballroom. In the main they were reserved for the display of plants which had been brought to maturity elsewhere, usually in a greenhouse of more utilitarian design. Nowadays genuine conservatories are somewhat of a rarity, though lean-to greenhouses built against dwelling houses and without direct access from a dwelling house are often referred to as conservatories.

COPPER-LIME DUST A fungicide which is obtained as a dry dust ready for application. It may be used as substitute for Bordeaux mixture.

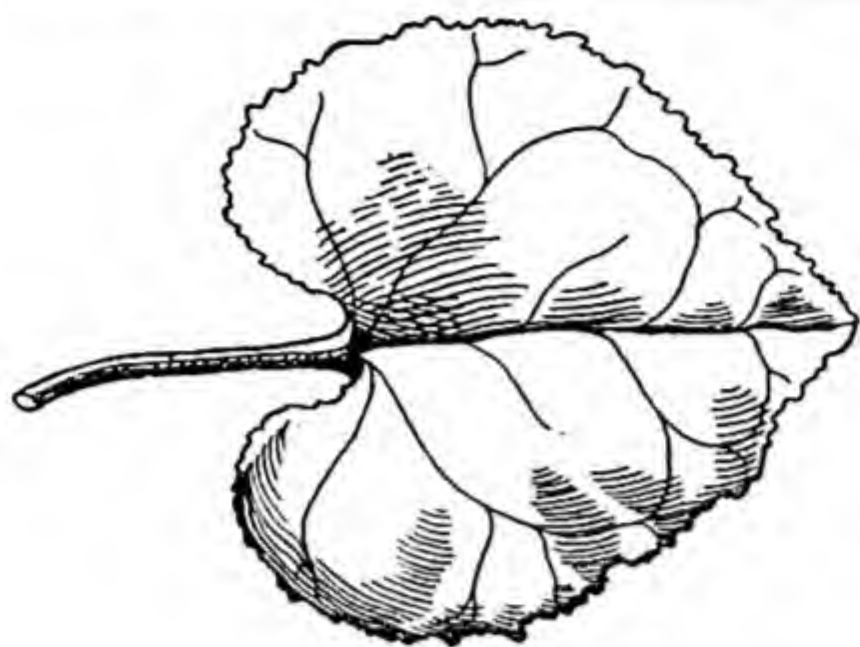
COPPER NAPHTHENATE A chemical sold under trade names as a wood preservative. It is considerably more efficient than creosote and has the additional merit of being harmless to plants so that it can be used with safety on seed boxes, wooden frames, greenhouse stagings etc. It is a liquid which can be applied to wood with a paint brush or may be sprayed on. The normal colour is a bluish green, but specially prepared colourless copper naphthenate can be obtained and it can also be obtained combined with a brown stain.

COPPER SULPHATE (Sulphate of Copper) This is popularly known as blue stone or sometimes as blue vitriol. It is one of the most powerful fungicides in the gardener's possession, but it can be seldom used by itself on account of the severe scorching effect it has on leaves and tender shoots. Occasionally a simple copper sulphate spray is recommended for winter use on woody plants, notably roses which have suffered from Black Spot disease, but care must be taken to delay application until all leaves have fallen. The recommended strength for this is 1 ounce of copper sulphate per gallon of water. It is more generally used in combination with some alkaline substance such as lime or washing soda which will neutralize its acidity and so make it safe for application to plants in leaf. Mixtures of this character are described under the headings, Bordeaux Mixture and Burgundy Mixture. Copper sulphate is also sometimes used as a weedkiller. It is very effective against broad-leaved weeds and can be used either dry, as fine powder at the rate of 4 ounces per square yard, or more economically, in solution at 4 ounces per gallon of water—a gallon to 4 or 5 square yards. Of course in this state, it must not be allowed to fall on garden plants or crops as it will kill these as readily as it kills weeds.

Copper sulphate is sometimes used to clear ponds of green scum, blanket weed and other algae. It is not a very safe method as it is very easy to kill all water plants and fish by giving a slight overdose. The correct quantity to use is 23 grains per thousand gallons of water. The copper sulphate may be placed in a small muslin bag tied to a fishing rod, and dragged through the water until it is dissolved.

CORDATE Heart-shaped; a botanical term applied, as a rule, to leaves which have a pair of rounded lobes at the base.

CORDON Any plant which would normally branch but is restricted to a single stem (or, occasionally, two or three stems) by pruning, pinching or other cultural methods. The term is most commonly applied in gardens to fruit trees and sweet peas. For fruit trees cordon training pro-



Cordate leaf

vides a method of growing many varieties in a comparatively small space. It is necessary that the trees should be grown on dwarfing stocks, otherwise it will be extremely difficult to keep them to the cordon form without destroying fruitfulness. In view of the absence of true dwarfing stocks for plums and sweet cherries, cordon cultivation is not recommended for these fruits, nor is it advised for Morello cherries, peaches or nectarines, all of which fruit most freely on the young growth which is largely removed under cordon cultivation. Cordon treatment has proved very successful for some varieties of apple and pear when worked on suitable stocks such as Malling IX for apples, or Quince C for pears. The usual method is to train the main stem obliquely, at first at a fairly steep angle, but gradually at a more acute angle, the trees being lowered a little annually as they increase in length. By this method a greater length of stem can be obtained while still keeping the whole tree within arm's reach from ground level.

Many methods of pruning have been recommended for cordon-trained fruit trees. One of the simplest and most successful consists in a combination of summer and winter pruning as follows. Each summer, towards the end of July or early in August, all side growths (laterals) are shortened to a length of five well-developed leaves. In November, these summer-pruned side shoots are further shortened to two or three buds. Only one leading growth is retained to each tree and this is left unpruned until

the tree attains the maximum desired length, which may be as much as 12 feet in the case of very obliquely trained trees. After this the leader is cut right out in November and if further leaders form, these are cut out in succeeding autumns.

A modification of this system which has proved successful with some rather vigorous varieties, such as Apple Laxton's Superb, is to carry out all the pruning in summer usually during the first fortnight in August. At this time, all side shoots are cut back to the basal rosette of leaves, roughly a length of $\frac{3}{4}$ inch from the base. No autumn pruning is carried out at all and the same treatment as in the former system is given to the leaders.

Cordon apple and pear trees can be planted as close as 2 feet apart in the rows, but the rows themselves should be at least 7 feet apart. It is desirable that the rows should run approximately north to south so that each side receives some direct sunlight. There is some difference of opinion as to whether oblique cordons should slope to north or south, but in fact it does not seem to make much difference which way they slope. See also *Training*.

The cordon-method of training is occasionally used for gooseberries, though instead of these being restricted to one stem, they are usually allowed to form two, in which case they are known as double cordons, and occasionally carry three stems, when they are known as triple cordons; moreover, gooseberries are usually grown vertically and not obliquely. The system of pruning is similar to that employed for apples. Red and white currants may be grown in the same way, usually as single stemmed, vertical cordons.

Another variation of the cordon system of training fruit trees, is that known as horizontal cordons. In this the stem is bent over about one foot above the ground level and thereafter trained horizontally and sometimes two stems are taken in opposite directions. Horizontal apple or pear cordons may be seen in some old gardens as edgings to paths, but are seldom planted nowadays.

With sweet peas, a cordon system of cultivation is almost invariably used when flowers of large size and on long stems are

required for cutting and exhibition. The point is pinched out of the seedling sweet pea when it is 2 or 3 inches in height. As a result two or three side shoots will form. The best of these is retained and the others are rubbed out. After this the plant is not permitted to branch again. The stem retained is trained vertically up a bamboo or suitable support. All side shoots which form are rubbed or pinched out. Even the tendrils with which the sweet pea would normally cling to the support are removed so that the whole of the strength of the plant is concentrated upon the production of one stem. Because the tendrils are removed it is necessary to tie the stem to the support. Sweet peas grown in this very artificial manner are much more liable to suffer from nutritional and other physiological troubles than are those grown naturally, in fact it is difficult to grow certain varieties as cordons. Nevertheless, it is the only system of cultivation by which really fine flowers can be obtained. Because all the growth goes into one stem, cordon sweet peas often grow very tall. A common practice is to untie the plants when they reach the top of 7- or 8-foot canes, lay them along the ground for 3 or 4 feet and then train them up a cane further along the line, a process known as layering.



A gladiolus corm with cormlets

CORM A storage organ differing from a true bulb in being composed mainly of thickened stem and therefore in being solid throughout and not made up of separate layers or scales. Such scales as it possesses are thin and papery and serve only for protection. Familiar examples of corms are to be found in gladiolus and crocus, which may be compared with the sectioned bulb of onion and daffodil or the scaled bulb of lily. The tiny corms that form round the parent corms are known as cormels or cormlets.

COROLLA The inner leafy whorl of a flower composed of the petals. It may be contrasted with the outer whorl or calyx which is composed of sepals. In most flowers it is the corolla which provides the display, the calyx being less showy and of a more protective character. However, there are occasions when the calyx is more showy than the corolla, as for example in clematis, and there are other flowers in which corolla and calyx contribute equally to the showiness of the bloom, as in the lily.

CORONA Botanically any appendage which separates the corolla of a flower from its anthers, but in gardens the term is almost exclusively reserved for the cup, crown or trumpet of a narcissus (daffodil).

CORROSIVE SUBLIMATE, see *Mercuric Chloride*.

CORYMB A botanical term for a flat-topped or nearly flat-topped flower cluster, in which the stalks of the various flowers which compose it do not start from a common point as in an umbel. A familiar example of a flower cluster of this type is to be found in the common yarrow—*Achillea Millefolium*.

COTYLEDON A seed leaf of which there is only one in monocotyledons and two in dicotyledons. The seed leaves are usually the first to appear, though in some plants, e.g. pea, they remain below ground. As a rule they differ considerably in character from the leaves which appear later. Usually they are much simpler in structure and are gene-

*Corymb*

rally completely undivided and regular in outline. Cotyledons are important to the gardener because their state of development is an indication of the best time at which seedlings should be pricked off. Also the gardener should learn to distinguish the cotyledons of cultivated plants from those of weeds, so that he may destroy the latter at an early stage before they have had time to rob the garden plant seedlings of food. It used to be considered that seedlings should not be pricked off until they had formed at least their first true leaves beyond the cotyledons, but more recent research has suggested that many seedlings pricked off in the cotyledon stage give the most satisfactory results.

CRANE FLY The long-legged flies, often known as 'daddy-long-legs', which may often be seen in great numbers in the summer and are the adult stage of the insect, the larvae of which are known as leather-jackets (q.v.). Though crane flies themselves do not harm plants, leatherjackets feed on the roots of grass and other plants and are most destructive.

CRENATE A botanical term applied to leaves the margins of which have shallow, more or less rounded teeth.

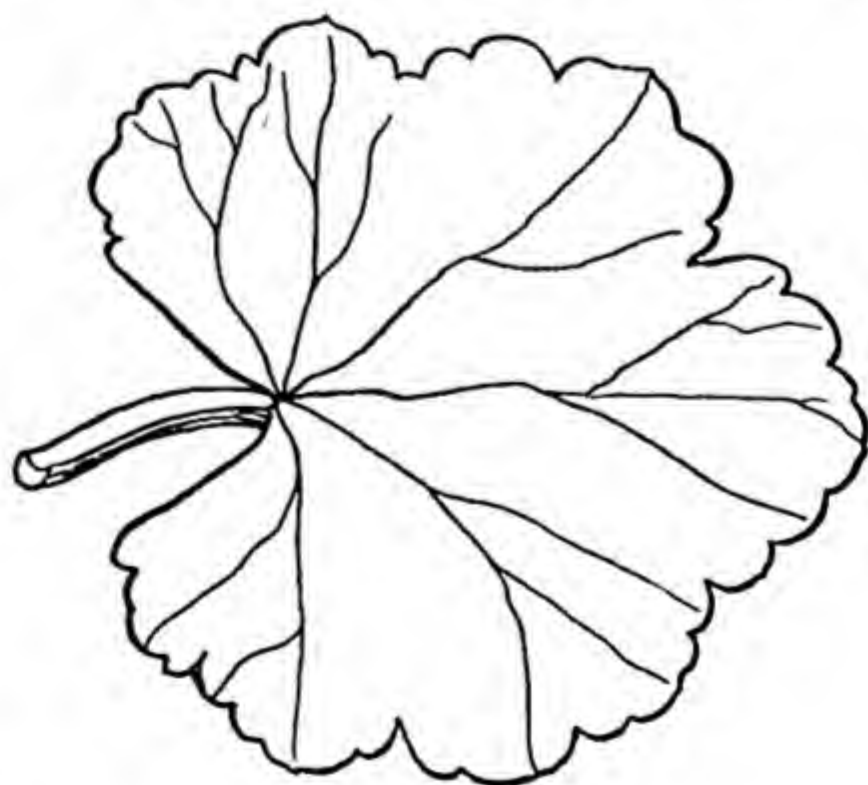
CREOSOTE A coal derivative which is much used as a wood preservative. Creosote

is a brown, free-flowing liquid which can be applied with a paint brush or can be sprayed on. Alternatively wood may be allowed to soak in a creosote bath. As a preservative it is not as effective as copper naphthenate and suffers from the further drawback that it scorches plants very severely and gives off fumes which have the same effect. Moreover in warm weather wood that has been creosoted many months previously and has become quite dry may, nevertheless, still give off sufficient fumes to do much damage to nearby plants.

CRESYLIC ACID A chemical used for sterilization of soil. It is not as effective against fungi as formalin, but it is more effective against some insects, including soil caterpillars and the larvae of chafer beetles and certain kinds of eelworms. (See *Sterilization*.)

CRICKETS These familiar insects, closely allied to grasshoppers and cockroaches, can cause damage in greenhouses in which they may attack seedlings of young plants in much the same manner as cockroaches. Possible remedies are the same as for cockroaches (q.v.). Crickets may also be trapped in inverted flower pots placed on sticks to raise them an inch or so above soil level.

CROCKS Broken flower pots which are used by gardeners as drainage material in

*Crenate leaf*

flower pots, pans, seed boxes, etc. The term crocking is used to describe this process of placing drainage material in receptacles of one kind and another. It is a most important term in the cultivation of plants under glass, as without good provision of drainage



Crocking a pot

many composts will become sour after a while. The usual method of crocking a pot is to place one rather large crock, convex side upwards, over the drainage hole in the bottom of the pot. This is covered with a layer of smaller pieces of crock and this in turn is covered with some of the coarse material left in the sieve when preparing potting composts, or with a wad of sphagnum moss.

CROSS-FERTILIZATION A flower is said to be fertilized when pollen reaches the ovules and unites with them to start the formation of a seed. It is said to be self-fertilized when the pollen comes from the same plant as that producing the ovules and cross-fertilized when the pollen comes from another plant. It should be noted that cross-fertilization does not mean merely the transference of pollen from one flower to another, but from the flower of one plant to that of another plant.

Cross-fertilization is useful to the gardener because it often enables him to combine the characteristics of two different varieties. It is also sometimes of supreme

importance to the fruit grower because certain varieties of fruit refuse to crop, or only crop very sparsely, when fertilized with their own pollen, though they crop freely when fertilized with the pollen of another variety of the same kind of fruit. Varieties of this character are said to be self-sterile or partly self-sterile according to the degree of their refusal to produce fruit from their own pollen. By contrast, trees which will produce full crops when fertilized with their own pollen are known as self-fertile varieties.

Cross-fertilization is sometimes favoured by nature and some flowers have elaborate methods of ensuring that they do not become fertilized with their own pollen, but only with that from other flowers. One of the most elaborate of these mechanisms is found in the common Early purple orchid of meadows, which relies on bees for fertilization. Pollen is carried in tiny sacs erect on very slender filaments just within the flower, and the stigma which must receive the pollen is still further inside the flower. When the bee enters in search of nectar, the filaments adhere to its proboscis by means of sticky pads at their base. While the bee is flying to another flower, these pads dry in such a way that the filaments bend forwards and the pollen sacs are in the right position to touch the stigma of the next bloom into which the bee thrusts its proboscis. It should be noted that natural devices such as these can only ensure the transfer of pollen from one flower to another and not necessarily from one plant to another.

The hybridizer who makes use of cross-fertilization for the purpose of breeding new plants, must take certain precautions if he is to be sure of his results. In the first place, the bloom which is to bear seed, should be emasculated at an early stage to prevent any possibility of its being fertilized with its own pollen. Emasculation is achieved by removing the anthers, which can usually be done by carefully opening the flower before it is fully expanded and drawing out the anthers with a pair of small forceps. After this the bloom should be covered in some way to prevent chance fertilization from other flowers by wind or insects. Grease-

proof-paper bags are often used for this purpose but cellophane bags are even better as they are more weather-proof. The pollen from the flower selected as a male parent, must be collected when fully ripe—a condition in which it becomes dry and powdery and is easily distributed. It may be collected with a camel hair brush and transferred direct to the stigma of the flower selected as a female parent or, if there is much cross-fertilization to be done, the pollen may be collected in a small box or glass phial from which it can be taken as required with a brush. If more than one variety of plant is being used as a pollen parent, care must be taken to clear the brush entirely of pollen grains between the applications of each variety of pollen. The most effective method of doing this is to dip the brush into a bottle containing alcohol or methylated spirits after which the brush must be allowed to dry. The bag used to cover the seed-producing flower, must of course be removed for the purpose of pollination, but should be replaced immediately afterwards and left in position until the seed pod or fruit begins to form, after which it can be discarded with safety.

As a rule, cross-fertilization is only successful with plants that are closely related. Varieties of the same species can usually be cross-fertilized without difficulty though, as already remarked, this is not always so with fruit trees. Plants belonging to different species, but of the same genus, can sometimes be cross-fertilized, but it is seldom that plants belonging to different genera can be successfully cross-fertilized. Gardeners sometimes hear tales of dahlias being crossed with chrysanthemums, tulips with daffodils and so on. These can be dismissed as sheer nonsense.

CROTCH The point at which the main trunk of a tree divides into branches.

CROWN The upper part of the root-stock from which the shoots grow. The term is usually confined to plants with a fairly fleshy or woody crown as in the peony, the lupin, the delphinium and rhubarb. The term is also occasionally used loosely, to cover the whole of a root, par-

ticularly of a root lifted for forcing, for example, rhubarb and sea-kale.



Rhubarb crowns

CROWN BUD (see *Bud* and *Stopping*).

CROWN GALL Curious tuber-like outgrowths which occur on the stems or roots of many different kinds of plant. They are particularly common on fruit trees and roses and on the former sometimes attain a great size. The name crown gall refers to the fact that these galls frequently occur at the crown of the plant, i.e. where stem joins roots, but they are by no means confined to



Crown gall

this position. The swellings are caused by infection by a bacterium, but as a rule the disease does not appear to have any markedly harmful effect. It is disfiguring rather than dangerous. No satisfactory remedy has been discovered but when the galls occur on stems it is best to cut them off and burn them. If they occur on the crown it is very difficult to do this without injuring the plant, and there the galls are best ignored.

CROWN ROT A disease which is peculiar to rhubarb and which attacks the plant at the crown causing this to turn brown and become decayed. The early symptoms are weak stems and dull-coloured leaves. If the plants are examined more closely it will usually be found that the crowns can be very easily knocked off owing to the decay which has already commenced. The disease is caused by a bacterium. No remedy is known; all affected plants should be burnt.

CRUCIFER Any plant belonging to the natural order *Cruciferae*. The name has reference to the four petals arranged in the form of a cross which is characteristic of the flowers of all plants in this natural order.

CUCKOO SPIT A popular name for a small insect pest which attacks many different kinds of plant. It is also known as frog-hopper but must not be confused with the frog fly which is a totally different insect. The adult cuckoo spit insect is a bug (*q.v.*), not unlike a tiny grasshopper in appearance, pale yellow in colour, which jumps vigorously if disturbed. The larva which does most of the damage, is also pale yellow or greenish, but it does not jump and is in fact, comparatively slow in all its movements. It lives by sucking sap from the plant and it protects itself by covering itself with a mass of froth. As the insect is most troublesome in late spring, the cuckoo season, it was erroneously associated by country people with the cuckoo, hence the name cuckoo spit. The insect can be killed with nicotine or HETP but either insecticide should be applied in the form of a very forceful spray to break through the frothy

covering and come directly in contact with the insects. On a small scale, hand picking is the most effective remedy.

CULTIVAR A botanical term for a cultivated variety.

CUTTING Any portion of stem, leaf or root separated from a plant and prepared and treated so that it will grow into a complete new plant. A cutting may be contrasted with a division which is also a piece separated from a parent plant and prepared and treated so that it grows into a complete new plant, but at the time of separation is not a single portion of stem, leaf or root, but a composite portion containing roots, dormant shoots or possibly leafy stems. The cutting may also be contrasted with the layer which resembles it in many respects but is treated in such a way that it produces roots before and not after its separation from the parent plant.

Cuttings may be of many different kinds and can be prepared from different portions of a plant according to its nature and kind. It is convenient as a first measure to classify cuttings as stem cuttings, leaf cuttings and root cuttings. Leaf and root cuttings need not be further differentiated, but there are so many different kinds of stem cuttings, that it is convenient to divide these into soft, half-ripe and hardwood or naked cuttings, and to further subdivide each of these into nodal, internodal and heel cuttings (or slips).

Leaf Cuttings are used chiefly for propa-



A rooted leaf cutting

gating a few greenhouse plants, notably begonias, gloxinias, streptocarpus and saint-paulias. They may also be used for a few hardy plants, notably ramondas and habereleas. For many of these no preparation is required, all that is necessary being to remove a well-developed leaf complete with its leaf stalk and press the latter into a bed of very sandy soil or a mixture of sand and peat, in such a way that the lower surface of the leaf lies flat on the bed. With some large leaves, such as those of Rex begonias, it is convenient to peg the leaf firmly to the surface of the sand or compost with pieces of wire bent like hairpins. These pegs should be placed over the main veins. Also with these large and heavily veined leaves, it sometimes pays to slit the veins crosswise every inch or so. When this is done, roots are formed from every incision and new crowns or shoots may also appear at each incision, so that one leaf will give rise to several new plants. These leaf cuttings are usually kept in a fairly damp, close atmosphere and for leaf cuttings of greenhouse plants, in a warm atmosphere as well, probably with bottom heat.

Root Cuttings are generally, though not invariably, used as a means of increase for plants which have fairly thick roots, for instance hollyhocks, anchusas, perennial statice, verbascums, oriental poppies, romneyas, horse-radish and sea-kale. It must not be assumed however, that all plants with



A root cutting of anchusa

thick roots can be increased in this way, nor does it follow that because a plant has thin roots, it cannot be propagated by root cuttings, e.g. such cuttings can be used very effectively to increase phloxes and gailardias, both of which have fibrous roots. As a rule root cuttings are taken while the plant is dormant, which means, generally, in winter. They are prepared by cutting the roots into sections, each from $1\frac{1}{2}$ to 2 inches long. When taking cuttings of thick roots, it is desirable, though not essential, to keep them the right way up when they are inserted and, as it is difficult to tell one end of a root cutting from another, it is usual when preparing the cuttings to cut them squarely through at the top but to make a sloping cut at the base. Thinner cuttings are usually inserted on their sides and so it is not necessary to distinguish one end from the other. The cuttings are placed in sandy soil or a mixture such as the John Innes cutting compost (see page 60). The thick cuttings are simply pushed into the soil or into holes prepared with a dibber. The tops of the cuttings should be just beneath the surface of the soil. Thinner cuttings are strewn thinly on the soil and covered with a further half inch of soil. Root cuttings of most hardy plants can be kept in an unheated frame or greenhouse or even in a sheltered place outdoors. They will form buds and shoots in the spring and will, in general, be ready for planting in a nursery bed by early summer. It may be noted that where phlox are suffering from eelworm attack, plants raised from root cuttings are usually free of the pest, which lives in the shoots and not in the roots.



Making a geranium cutting, three joints long

Soft Stem Cuttings are those prepared early in the season of growth, while the shoots are still quite succulent. They provide a useful method of increasing a great many herbaceous plants, and some subshrubs including chrysanthemums, perpetual flowering carnations, geraniums, delphiniums and lupins. These cuttings are almost always of the 'nodal' type, which means that they are severed at the base just below a node or joint. The method of preparation is to trim off the lower leaves with a sharp knife and cut the base of the cutting cleanly through immediately below a joint. The length of the completed cutting will depend on the character of the plant from which it is taken and may be anything from $\frac{3}{4}$ inch for plants with small shoots such as lobelia and ageratum, to 3 or 4 inches for plants with comparatively large shoots such as delphiniums, lupins and pelargoniums.

As cuttings of this type are very liable to lose moisture freely, it is essential to keep them in a fairly close, damp atmosphere and to encourage them to form roots as quickly as possible. Under favourable conditions they may be rooted in three or four weeks. Soft cuttings are frequently inserted in a propagating case or box, within the greenhouse, that is to say, a small frame or box with a closed lid, placed on the greenhouse staging. This can be half filled with peat or coconut fibre in which the pots or boxes containing the cuttings can be plunged. A very damp atmosphere can be maintained within such a propagating case and, if bottom heat can be applied, rooting will be effected very rapidly. It must, however, be pointed out that with cuttings of hardy plants such as lupins and delphiniums, too much heat and moisture may encourage damping off and other fungal diseases.

Soft cuttings may be rooted in pure sand or compost such as the John Innes cutting compost (see page 60). If pure sand is used it is important to remove the cuttings to an ordinary compost containing soil directly they form roots, as in the sand they will soon be starved. The cuttings must be inserted firmly to about a quarter their own depth and the sand or compost should be



A suitable shoot for a carnation cutting

made firm round the base of each cutting. Usually a small wooden dibber or pointed stick is used, both to make the hole to receive the cutting and to firm the sand or compost round it. It is frequently recommended that when soft cuttings are inserted in pots or pans, they should be placed round the edge of these receptacles so that they are partly in contact with the earthenware, and it certainly seems that in this position they form roots more rapidly than when placed in the middle of the pot or pan.



Taking a chrysanthemum cutting

At first, soft cuttings usually flag a little even when they are shaded from all strong sunshine, but in a suitably close atmosphere they will soon pick up. Directly roots are formed the cuttings will start to grow again, an indication that they are ready to be transferred to more normal growing conditions.

When propagating chrysanthemums, it is usually advised that soft cuttings should be prepared only from basal shoots growing direct from the roots and not from soft shoots coming from the old woody flower stems. For propagating perpetual flowering carnations, it is usually advised that soft cuttings be prepared from non-flowering side shoots appearing midway up the flowering stems. In this instance the shoots are pulled off where they join the main stem and no further preparation is needed beyond removal of basal leaves and the trimming of any strip of 'bark' which may have been removed with the cuttings. This is what is known as a 'heel' cutting.

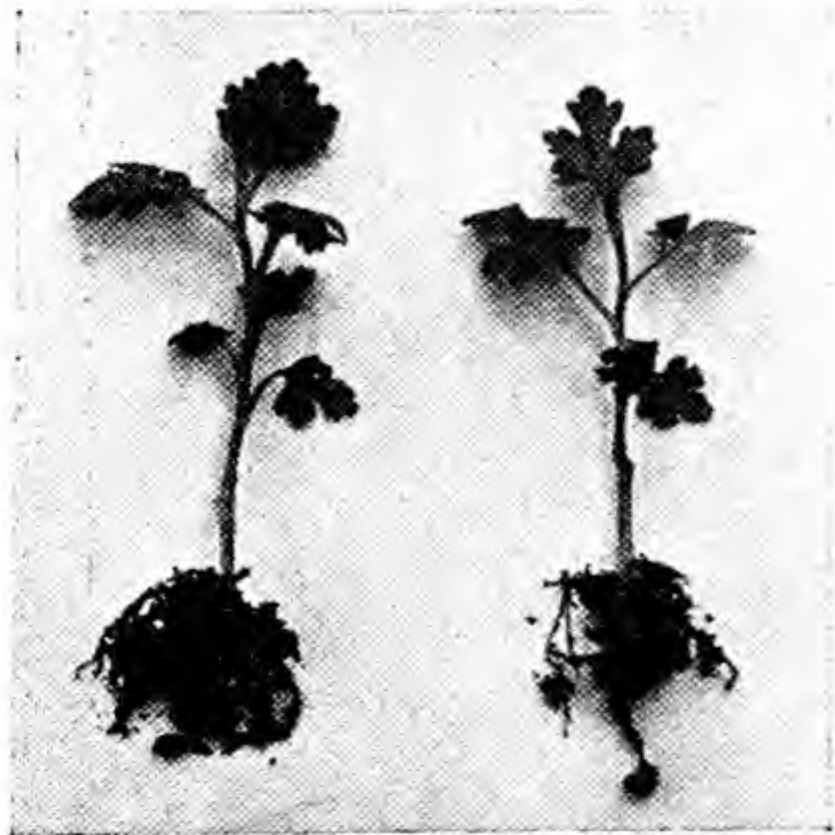
Half-ripe Cuttings are those prepared from shoots or stems that have nearly completed their growth but have not yet become fully woody. They provide an important method of increasing many shrubby plants, including heathers. Half-ripe cuttings are usually taken in June, July and early August; they are often of the

'nodal' type (that is to say severed at the base immediately below a joint) but some gardeners prefer to take 'heel' cuttings (that is to say, side-shoots pulled away with a strip or heel of the main stem attached). In just a few instances internodal cuttings are taken, i.e. cuttings severed at the base, mid-way between two joints and not just below a joint. Some gardeners believe that internodal cuttings of clematis root better than nodal cuttings, though there is not general agreement on this point.

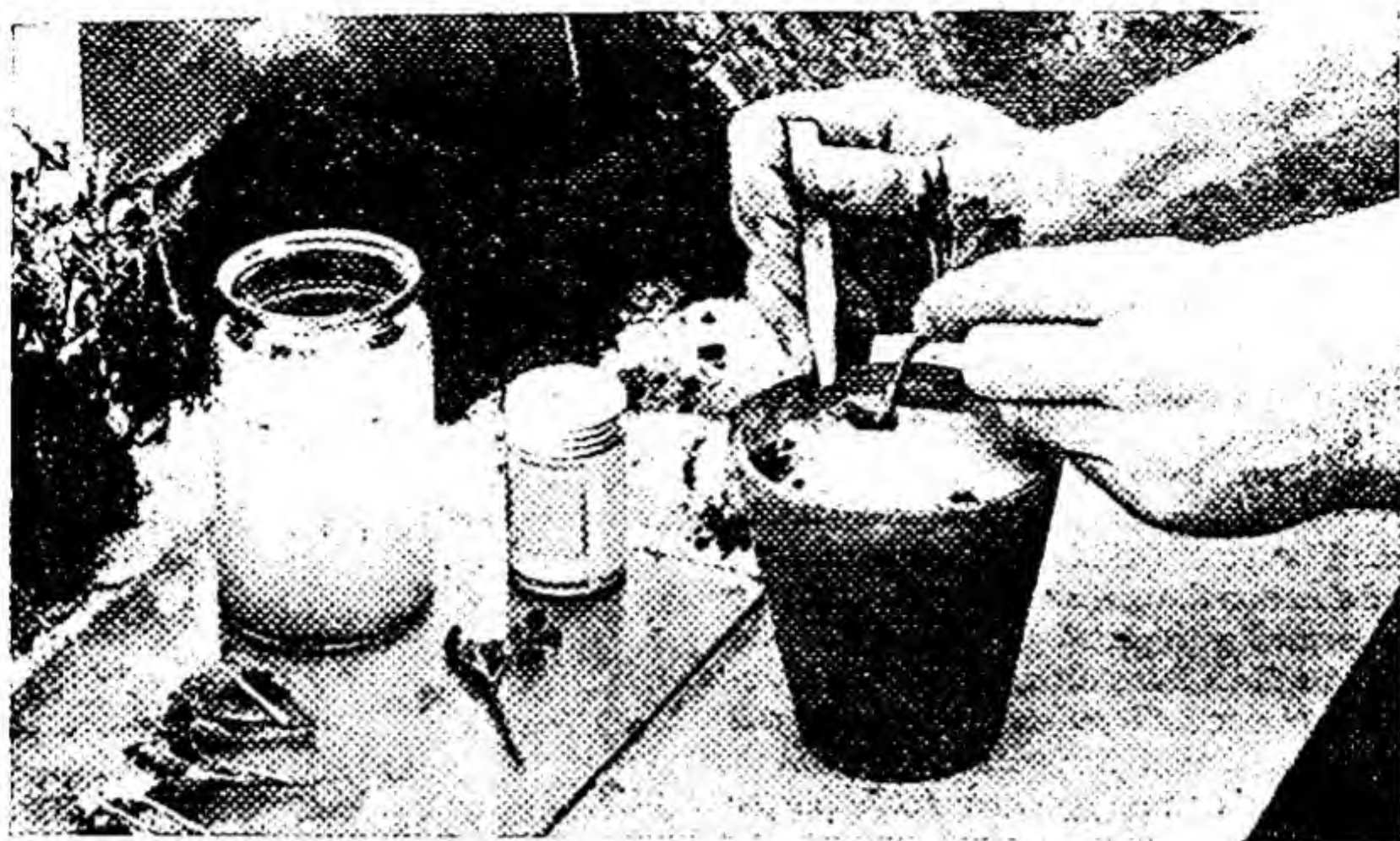
Half-ripe cuttings are less succulent than soft cuttings and therefore less liable to lose moisture rapidly. In consequence they do not require quite so damp an atmosphere, though they are usually kept in a close frame or propagating case. They are encouraged to root fairly quickly though not quite as quickly as soft-wood cuttings. much shading is undesirable. Rooting media are the same as for soft stem cuttings, and they are prepared in exactly the same way. As a rule cuttings of this type taken in mid-July will be rooted and ready for transference into pots or beds of freshly prepared soil by early autumn.

Hard-wood or naked cuttings are those which are prepared from fully ripened growth at the end of the growing season usually, in this country, in October or November. They provide an important method of increasing many shrubby plants including most soft fruits such as gooseberries and currants. As a rule they are nodal cuttings, though again some gardeners think that 'heel' cuttings root more successfully.

Because of their ripe nature, hard-wood cuttings do not readily lose moisture and therefore it is unnecessary and unwise to keep them in a close atmosphere or to try to force them to root very rapidly. Frequently they can be inserted outdoors without protection and this is the normal method employed with soft fruits and many hardy shrubs. With some cuttings, and particularly with those of evergreen trees and shrubs, it pays to give the cutting the protection of an unheated frame, with the light used occasionally in severe weather or replaced by a screen of thin wood laths spaced a little



Rooted chrysanthemum cutting



Inserting chrysanthemum cuttings which have previously been treated with hormone and immersed in insecticide

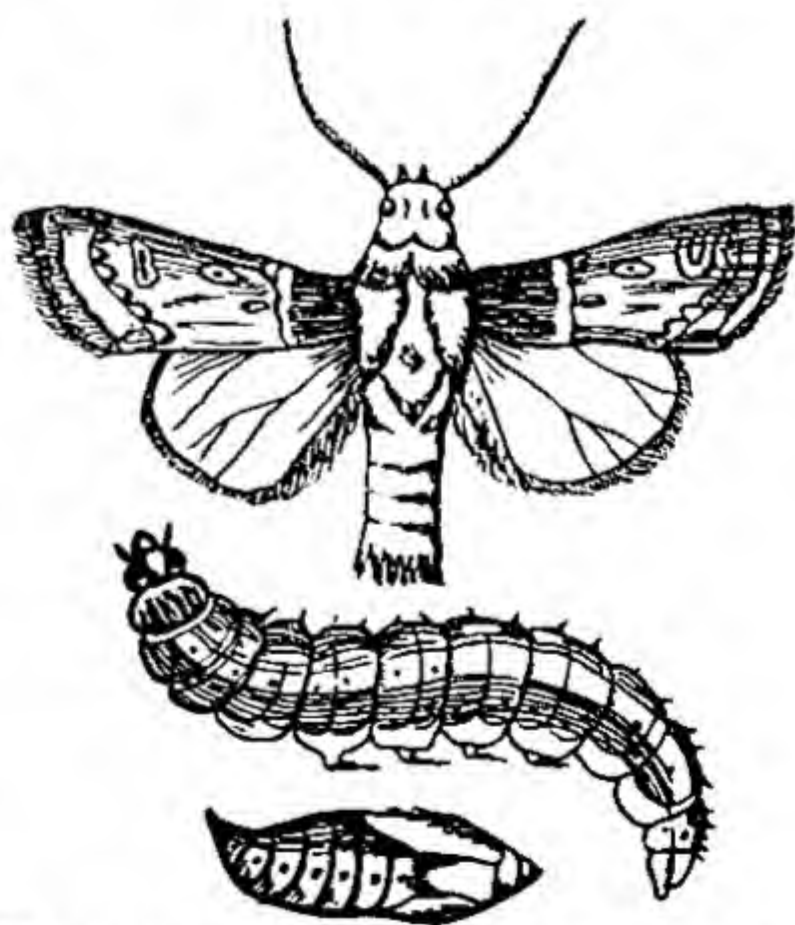
apart so that air can circulate but some shelter is provided.

Hard-wood cuttings are as a rule considerably larger than either soft or half-ripe cuttings, and may be as much as one foot in length for many soft fruits and shrubs. With deciduous trees and shrubs, the leaves will already have fallen or be on the point of falling, and nothing further need be done about them, but when making hard-wood cuttings of evergreen plants, it is desirable to remove the lower leaves as for soft and half-ripe cuttings. The cuttings should be inserted firmly 2 to 4 inches deep according to size. The usual method is to chop out a straight-backed trench 2 to 4 inches deep, in a sheltered place outdoors, scatter a little coarse sand in the bottom of this trench, place the cuttings upright in it, 2 or 3 inches apart, and replace the soil, pressing it firmly round the cutting with the foot. As a rule hard-wood cuttings, taken in the autumn, will not start to make roots until the following spring, and will not be ready for transplanting until the following autumn, that is approximately one year from the time they were taken.

Cuttings such as those of blackcurrants and gooseberries, which are required on a

'leg', should have two buds removed from that part of the cutting which is in the soil, to prevent sucker growth.

CUTWORMS An American term which has now been widely adopted in this country for those kinds of caterpillar which



The turnip moth. The caterpillars are known as cutworms

live in the soil. One of the most important of these is the turnip moth caterpillar, while another is the caterpillar of the yellow underwing moth. Such caterpillars can be killed or driven away by dusting the surface soil with finely powdered naphthalene at the rate of 2 to 4 ounces per square yard and either hoeing or raking this in. They can also be poisoned with various poison baits, one of the most effective of which is Paris green (*q.v.*) and bran, 4 ounces of Paris green to 7 pounds of bran, very slightly moistened to form a crumbly mash. Small heaps of this should be placed here and there on the surface of the soil and may be covered with plates or pieces of wood to prevent birds from eating them. An alternative treatment is to use a proprietary soil insecticide based on gamma-BHC. Such preparations must be used according to manufacturer's instructions.

CYANIDE, see *Calcium cyanide*.

CYME A flat-topped or slightly dome-shaped flower head in which the central flowers open first.

DADDY-LONG-LEGS A popular name for crane flies (*q.v.*).

DAMPING DOWN When plants are grown in greenhouses it is important to maintain the correct degree of moisture in



Damping down



the atmosphere. This will vary according to type of plant, e.g. cucumbers require very much more atmospheric moisture than do tomatoes. There are several ways in which moisture can be supplied to the atmosphere, but one of the most important is that known as damping down. This means that paths, stages and even the walls of the greenhouse are moistened. The degree and frequency of damping down will depend on the degree of moisture desired. For those plants which require a very humid atmosphere, it is usual to cover the stagings with gravel or coarse ashes as these hold moisture better than a solid staging of wood, brick or concrete. For the same reason, a soil or ash floor is better for moisture-loving plants, than a floor made of concrete or bricks. In hot weather and for moisture-loving plants, it may be necessary to damp down three or four times a day. The work is done either with a watering can fitted with a fine rose, or with a syringe. It should be noted that the object of damping down is to wet surroundings of

the plants and not the plants themselves. In the absence of adequate damping down, many plants will suffer from scorched foliage and serious attacks of red spider; in fact damping down is one of the best remedies for red spider.

DAMPING-OFF A general name given to various diseases which affect seedlings at



Damping-off

or near soil level causing the stems to decay and the whole seedling to topple over and die. All these diseases are caused by fungi but several quite distinct species are involved. However, the gardener need not attempt to distinguish between one kind of damping-off and another as prevention and treatment are the same for all. The fungi are soil-borne so soil sterilization, either by heat or with a chemical such as formaldehyde, will give reasonable protection. Damping-off tends to be prevalent where seedlings are overcrowded and with too little air and too much moisture, so thin sowing, early pricking off, careful watering and free ventilation are cultural points to be observed. If the disease does occur, its spread can usually be prevented by watering the soil and seedlings with Cheshunt compound. Watering with Cheshunt compound will also help to prevent the disease from making an appearance.

DCPA An abbreviation used for 2 : 4 dichlorophen-oxyacetic acid, a chemical which acts as a plant hormone and, applied

in excess, is a useful selective weed killer to destroy weeds on lawns. It is applied as a fine spray in water at a concentration of 0.1 per cent. Sufficient should be used to wet the leaves thoroughly. It is most effective where used on seedling weeds or those that are making new growth. This chemical is sometimes known as 2 : 4 D.

DD The abbreviation commonly used for a chemical named dichloropropane. This is used as a soil fumigant against the root-knot eelworm of tomatoes. It is a liquid and it is applied by injecting it into the soil with an instrument rather like a giant hypodermic syringe. It is used at rates varying from $2\frac{1}{4}$ to $3\frac{1}{2}$ pounds per rod. Injections are made to a depth of 8 inches and 12 inches apart. Treatment is carried out on vacant ground a few weeks before it is to be planted.

DDT A chemical which is a powerful insecticide. DDT may be used to kill caterpillars of all kinds, weevils, beetles and their larvae (including flea beetles) earwigs, woodlice, thrips, scale insects, white fly, wireworms, millepedes, grasshoppers and crickets. It can be purchased as a dust mixed with a suitable carrier and ready for application; as a wettable powder which must be dissolved in water; as a paste to be dissolved in water; as an emulsion with oil; in canisters combined with a suitable pyrotechnic for use as a smoke, or in the form of an aerosol. All these are proprietary formulations which must be used strictly in accordance with manufacturer's instructions. DDT kills a great variety of insects and its effects last for a considerable time. In consequence, if applied at unsuitable times of the year, it may do more harm than good by killing useful insects which prey on the harmful species. In orchards it is not advisable to use DDT after the middle of April, as later than this there is a danger of there being a big increase in the population of red spider mite owing to the destruction of insect predators which live on red spider. DDT is poisonous to warm-blooded animals including human beings but is unlikely to harm them at the concentration used on plants.

DEAD-HEAD The removal of faded flower heads. It is an important operation in the cultivation of some very free-flowering rhododendrons as, if the flower-heads are allowed to remain and carry seed, few flower buds are likely to be formed for the following year.

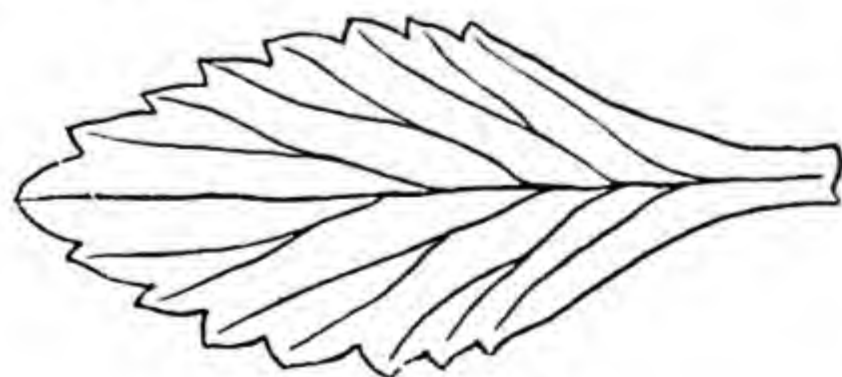
DEADHEADING, see *Pruning of Ornamental Plants*.

DECIDUOUS A name given to plants which lose their leaves in winter. It is particularly applied to trees and shrubs and may be contrasted with the term evergreen, which is applied to a plant which retains its leaves throughout the winter. Deciduous trees and shrubs are of many different kinds and may have little in common, but there is one important cultural point which applies to most of them, namely that they are best transplanted during the period when they are leafless or practically leafless, roughly from about the end of October to the end of March. For town planning deciduous plants have a big advantage over evergreens, namely that they start afresh each year with a clean lot of leaves. The old leaves of evergreens are apt to get so coated with grime and soot that they are more of a liability than an asset to the plant.

DECUMBENT A botanical term used to describe stems which lie on the ground for part of their length and then turn upwards.

DEHISCENT A botanical term used to describe a seed-pod or anther which opens to discharge its contents.

DENTATE A botanical term used to



A dentate leaf

describe leaves which have rather coarsely toothed edges.

DERRIS An insecticide obtained from the roots of certain tropical plants. The active principle of derris is a chemical named rotenone and the effectiveness of any particular sample of derris will depend upon the percentage of rotenone it contains. A good sample should contain 4 per cent. of rotenone. Derris can be applied as a dust mixed with a suitable carrier or it can be purchased as a wettable powder which should be dissolved in water at the rate of 1 to 2 ounces per 5 gallons. Powders are usually purchased as proprietary dusts ready for application. Wettable powders are rendered more effective if a proprietary spreader is added according to manufacturer's instructions, or 4 ounces soft soap to each 5 gallons of prepared insecticide. Derris is effective against most caterpillars, weevils, beetles and their larvae, slug-worms, aphides, and red spiders.

Derris is often described as non-poisonous to warm-blooded animals including human beings. This is not true though it is far less poisonous than arsenate of lead, nicotine or HETP. There is little danger in using liquid preparations but care should be taken not to inhale derris dust in any quantity. Derris is very poisonous to fish.

It can be applied at any time of the year.

DIBBER (Dibble) A tool used for making holes in soil. Dibbers are of many sizes and types, from the small wooden dibbers about the thickness of an ordinary lead pencil, which are used for making holes into which cuttings are inserted, to the large steel or steel-shod dibbers as thick as a spade handle and a foot or more in length used for planting potatoes, bulbs, brassicas, etc. There is no possible objection to the use of dibbers for inserting cuttings, but for planting large things, such as bulbs, potatoes and brassica seedlings many gardeners prefer to use a spade or trowel, because the dibber tends to consolidate the soil too much round the plant and may also make too pointed a hole, in which the potato or bulb will be suspended with an air space beneath. There can be no doubt that the

planting of many seedlings can be done more rapidly with a dibber than with a trowel. All dibbers should have rounded rather than pointed tips. Small dibbers used for planting cuttings or pricking out seedlings, are often made from hazel branches, whittled down and smoothed off.

DICOTYLEDON A plant with two cotyledons or seed leaves in contrast to those which have only one cotyledon or seed leaf and are hence known as monocotyledons. The distinction is very important from the botanical viewpoint and provides one of the fundamental methods of grouping plants for classification.

DIDYMELLA A disease of tomatoes which causes a canker or decay of the stems. It is usually the main stem which is attacked and this turns brown, shrinks and eventually decays. The attack is usually at or near the base of the plant. All affected plants should be removed and burned and the soil around neighbouring plants watered with Cheshunt compound to prevent the spread of the disease. Where this disease has occurred it is desirable either to change the soil completely in the winter, or to sterilize it by heat or with a chemical.



Die-back attacking a rose bush. The portion marked A is dead and the shoot must be cut back to B

DIE BACK A general term applied to several quite different diseases which cause growths to die from the tips backwards. A familiar example occurs in roses. If a plant that is suffering from die back is closely examined, it will be found to have a ring of dead bark either at the base of the particular stem that is dying or towards the base

of the plant itself. It is this ring which is strangling the plant by preventing the proper flow of sap. In roses, gooseberries and certain other plants, the disease is caused by the same fungus as that which also produces grey mould disease under different circumstances. In plums die back is caused by a different fungus and there is an absence of the customary ring of decayed bark. Apricots, peaches and nectarines are also subject to die back diseases.

Affected branches should always be cut back to completely healthy tissue and the wounds should be painted with white lead paint, Stockholm tar or some other approved wound dressing. When treating gooseberries some benefit can be obtained by spraying with copper sulphate at 1 ounce per gallon of water just before the buds burst in early spring. The same remedy can be tried in winter on roses, but must never be used on plants that have leaves or bursting buds. Bordeaux mixture may also be applied to gooseberries as soon as the flowers have set, and to roses at any time during spring and summer. Good cultivation and, in particular, an adequate supply of potash in the soil will help to keep die back from occurring.

DIELDRIN An insecticide principally used against fly pests such as carrot fly, onion fly, cabbage root fly, and celery fly. It can be obtained as a wettable powder or a liquid, and is used as a spray.

DIGGING There are many different methods of digging the soil, but all have two main objects—the destruction of weeds and the breaking up of the soil so that air may penetrate and the natural processes of decay, by which plant foods are liberated, may be speeded up. Sometimes digging also provides a convenient opportunity for mixing manures or fertilizers with the soil.

There are three principal systems of digging, which may be described as plain digging or single spit digging; double digging or digging to a depth of two spits, and trenching or digging to a depth of three spits. A spit is the depth of the blade of a spade, roughly 10 inches.

Plain or single spit digging is accom-

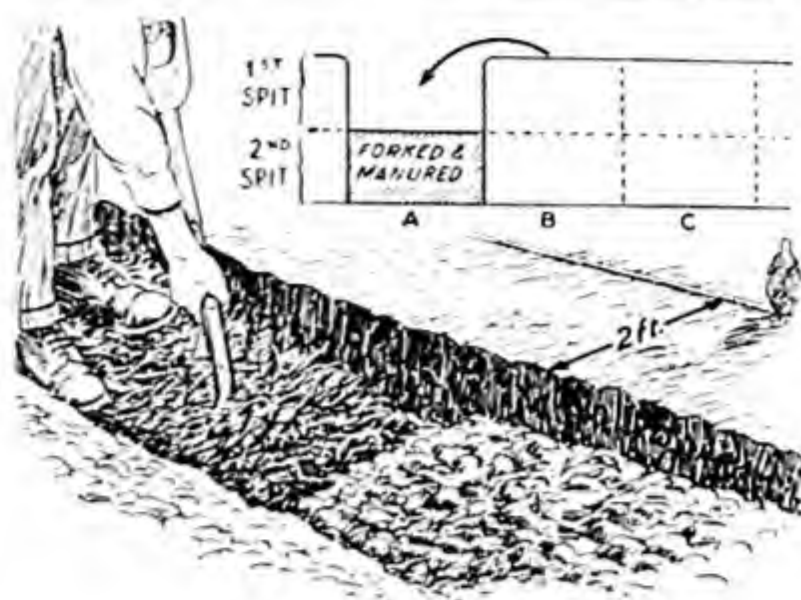


Single spit digging

plished by driving the spade into the soil to the full depth of its blade, lifting the soil and turning it right over. In order that this work may be done conveniently and neatly it is necessary to maintain a small trench between dug and undug soil. Before commencing to dig any piece of ground, a trench 10 inches deep and approximately the same in width should be opened across one end of the plot, and the soil transported to the other end. The digger then starts at one end of the opened trench and turns the soil, spadeful by spadeful, forward and over so that any weeds it may contain are completely reversed and buried. He progresses along the length of the trench until a complete narrow strip has been turned into it, so opening a second trench of approximately the same dimensions as the first. He then proceeds to turn another strip of soil, spadeful by spadeful into this trench and continues in this manner, strip by strip, until he reaches the far end of a plot where the soil removed from the first trench is used to fill the last.

In dealing with very long plots, it is sometimes more economical of labour to divide them in half lengthwise, opening a trench across one half of the plot only, and transporting the soil to the other half, but at the same end. The digger then works down one half of the strip and back up the other half, finishing alongside the point at which he started. This saves the labour of carrying soil from one end to the other.

Double digging can also only be done



Digging in manure

properly if an open trench is maintained throughout, but the trench must be considerably wider. It should be opened at one end of the plot as for plain digging and should be 10 inches deep and 2 feet wide. The soil is transported to the other end of the plot or, where this is a long one, it can be divided in half and the soil removed to one side as already described for plain digging. Before commencing to turn more soil into the opened trench, the digger should take a fork, step into the bottom of the trench and break up the soil in this to the full depth of the tines of the fork. This is done in the same way as for plain digging, working from one end of the trench to the other. In this way the soil is broken up to a depth of approximately 20 inches. Now a further strip of ground 2 feet wide is marked out and the top soil from this is turned forwards and over into the first trench. In this way a further 2-foot-wide strip of second



Double digging—forking the second spit

spit soil is exposed which is in turn broken up with a fork. The work proceeds in the same way until the final trench is reached, which is filled with the soil removed from the first trench. It will be seen that by this method, though the soil is cultivated to a depth of about 20 inches, the top soil remains on top and the second spit soil remains beneath it.

Trenching is the third method of cultivation. By this, soil can be cultivated to a depth of 30 inches or more. Again it is necessary to start with a trench, but this time it should be at least 3 feet wide. The soil from this is removed to a depth of 10 inches and transported to the other end of the plot, or to one side as for long plots which are divided lengthwise. Next, the trench so opened is divided in half lengthwise and the soil from the forward half is removed to a further depth of 10 inches. This is also transported to the other end of the plot or to one side, but is kept in a separate heap from the soil removed from the top spit. Now the digger gets into the bottom of the 18 inch wide and 20 inch deep trench and breaks up the subsoil with a fork, as for double digging, though using this method he will, of course, be going to a depth of about 30 inches.

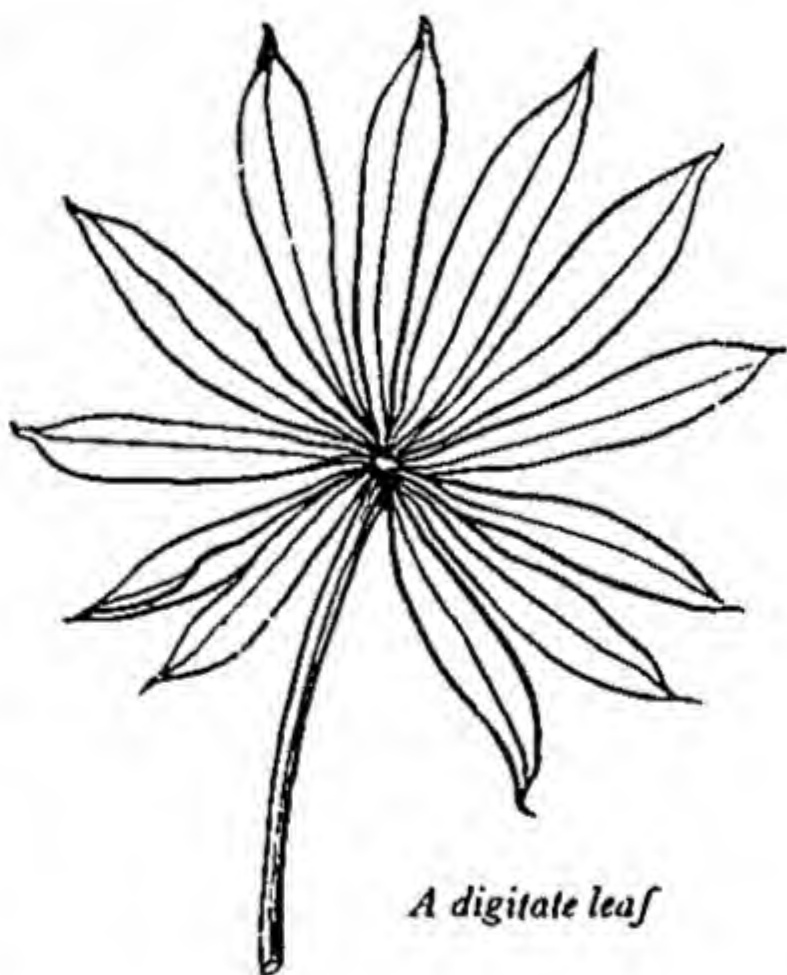
The next step is to dig the 18 inch wide strip of second spit soil on to the forked subsoil. When this is completed a further 18 inch strip of subsoil will be exposed and this, in turn, is broken up with a fork to a depth of 30 inches or thereabouts.

Now a further 18-inch-wide strip of top soil is marked out. The soil from this is turned well forward on to the step of second spit soil in trench No. 1. By this means another 18 inch wide strip of second spit soil is exposed and this is turned forwards on to the forked subsoil in trench No. 1. The subsoil in trench No. 2 is now broken up with a fork. Work proceeds in the same manner until the end of the plot is reached, when the smaller heap of second spit soil is used to fill the remaining second spit trench and the larger heap of top spit soil is used to fill the top spit trench. It will be seen that by this method, though the soil is broken up to a depth of about 30 inches, top spit remains on top, the second spit

remains beneath it and the third spit is broken up but not raised.

A variation of this method of trenching is to bring some or all of the subsoil to the top and bury some or all of the top soil. This is advocated by some gardeners as a method of rapidly increasing the depth of fertile soil, but if the subsoil is very infertile or of an unworkable character, as for example stoney or clayey, it is a method which may land the gardener into serious difficulties. Really it is only in exceptional circumstances that it is justified.

DIGITATE Hand-like; a botanical term used to describe leaves which are composed of several separate leaflets all joined at one point as in the horse-chestnut.



A digitate leaf

DIOECIOUS A botanical term applied to plants in which the flowers on any one plant are either entirely male, that is to say with stamens and no pistils, or entirely female, that is to say with pistils and no stamens. An example is *Skimmia japonica*, and if the female plants of this are to produce berries, a male plant must be placed near to them. The same thing applies to some of the varieties of holly and also to the sea buckthorn (*Hippophaë*). (See *Monoeious*.)

DIPLOID A plant with the normal number of chromosomes for the species to which it belongs. See *Polyploid*.

DISBUDDING The process of removing surplus buds or shoots. Disbudding is an important item in the cultivation of many flowers particularly when required for show. Roses are restricted to one flower per stem, other flower buds being removed at an early stage. Carnations are frequently restricted in the same way to one flower per stem, and the practice is common with chrysanthemums when large flowers are required. As a rule, it is the central or terminal bud that is retained and the side or axillary buds that are removed, but occasionally this rule is reversed. It may, for example, be reversed where roses with very full flowers are concerned, particularly early in the season or when the weather is unusually wet, the reason being that the central or terminal buds are liable to be too full of petals and to 'ball' (*q.v.*) or fail to open properly as a result. The smaller side-buds will give slightly smaller flowers which will open with less difficulty when conditions are adverse.

The disbudding of chrysanthemums is often referred to as 'taking the bud', a rather misleading term as, in fact, the bud is not taken in the sense of being taken away but precisely the opposite.

As a rule, when plants are disbudded the buds which are removed are alternative flower buds, but with chrysanthemums it

is very often growth buds or small shoots which have to be removed and not flower buds. This is always the case when the bud that is to be retained is a crown bud (see *Bud*), for crown buds are surrounded by other shoots and not by flower buds.

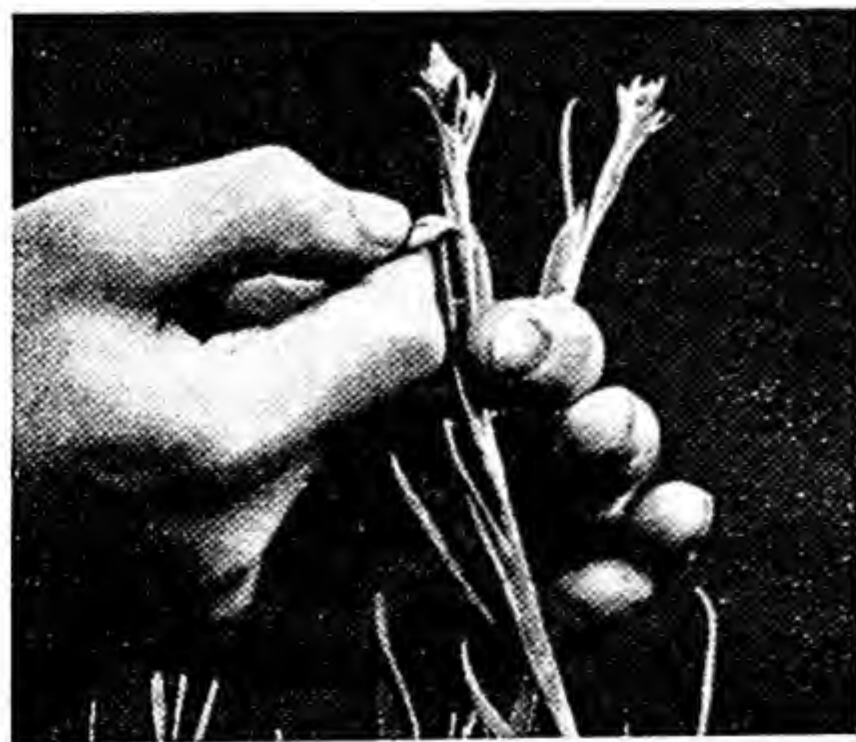
By removing shoots or buds the gardener concentrates the whole strength of that particular stem on the remaining bud and forces it to develop to its fullest extent. As a rule disbudding is carried out as early as possible, which in practice means just as soon as the buds that are to be removed can be conveniently handled. If the work is delayed, the development of the bud that is to be retained will be checked and occasionally the gardener makes use of this fact. By delaying disbudding, he can produce a slightly later and, if necessary, a slightly smaller flower.

Disbudding is usually done by pinching or rubbing out the unrequired buds between the first finger and thumb, but occasionally the point of a penknife is used.

DISK-FLORETS The small, tubular florets which form the compact centre of the flowers of daisies and other members of the Compositae or Daisy family. Some of these flowers are surrounded by ray-florets which make them more showy.

DNC An abbreviation, also sometimes written as DNOC, for the chemical named dinitro-ortho-cresol, a bright yellow dye which is used in the garden both as an ingredient of petroleum winter washes for the destruction of hibernating insects and insect eggs, and also occasionally as a weed-killer. It is a poison, but when prepared with petroleum oil as a winter wash for fruit trees the amount of DNC present is not likely to cause injury to human beings or animals. As a weedkiller DNC is used at much greater strength and fatal accidents have occurred.

DNC winter wash must be purchased as a proprietary article and should be prepared according to manufacturer's instructions, the usual strength being $2\frac{1}{2}$ to 3 pints of the purchased emulsion to 5 gallons of water. The spray will stain the skin and particularly the nails and is also apt to in-



Disbudding a carnation

flame the eyes, so old clothing and gloves should be worn and preferably goggles, and any exposed skin should be smeared with vaseline. DNC winter wash can be applied later than tar oil winter wash, the usual time being from the middle of February to the second week in March.

As a weedkiller DNC must also be purchased as a proprietary article for which manufacturer's instructions should be obtained. It is diluted with water and applied as a fine spray. It is particularly effective in killing charlock, corn poppies, goose foot, may weed, and fumitory.

DOLPHIN FLY A name sometimes used for black fly (*q.v.*), particularly that species of black fly that attacks broad beans.

DORMANT A condition of temporary cessation of activity. Few plants are completely dormant in the sense that no changes are going on within them, but some plants, and particularly those with storage organs such as bulbs, corms or tubers, may have a prolonged period of apparent dormancy. This is usually, though not invariably, in winter. Familiar examples of plants which are dormant in summer are nerine, the bulbs of which are almost completely at rest from about mid-summer until August, and the greenhouse cyclamen which has a period of semi-dormancy at the same time of year. Deciduous trees and shrubs, that is those which lose their leaves in autumn, are described as being dormant from the time their leaves drop until the buds begin to swell in late winter or early spring.

Buds are said to be dormant when they are inactive. Buds of this type are to be found on most trees and shrubs at any time of the year.

Many seeds have a period of dormancy after they ripen and during this time will not germinate however favourable the conditions. There are, however, other seeds which have no such period and can be germinated as soon as they are ripe.

DORSAL Back; a botanical term which in garden use is practically confined to the description of the flowers of some orchids.

Thus the 'dorsal sepal' of a cypripedium is the sepal which stands erect at the back of the flower and is often the most striking feature of the flower.



The dorsal sepal of a cypripedium (indicated by arrow)

DOT PLANT A plant of taller growth used in a groundwork of lower plants to stand out as an individual specimen. In formal bedding schemes dot plants are often used to break up the monotonous line that would result from using nothing but plants of the same height. Any plant can be used as a dot plant if it is naturally taller than the plants with which it is to be associated or if it can be trained to make it stand up above them. Sometimes the same kind of plant can be used both as groundwork and dot plants, e.g. ivy-leaved pelargoniums may be allowed to sprawl on the ground except for an occasional specimen which is trained up a stick.

DOUBLE FLOWERS, see *Flore Pleno*.

DRAINAGE The drainage of soil is most important, since if water cannot move fairly freely through it, air may be excluded and the more beneficial micro-organisms (see *Bacteria*) may be destroyed. Badly drained soils are often sour and even after drainage has been improved it may be necessary to correct this acidity by suitable dressings of lime. Moreover, the roots of plants require air and will die if deprived of it. Another bad effect of waterlogging is

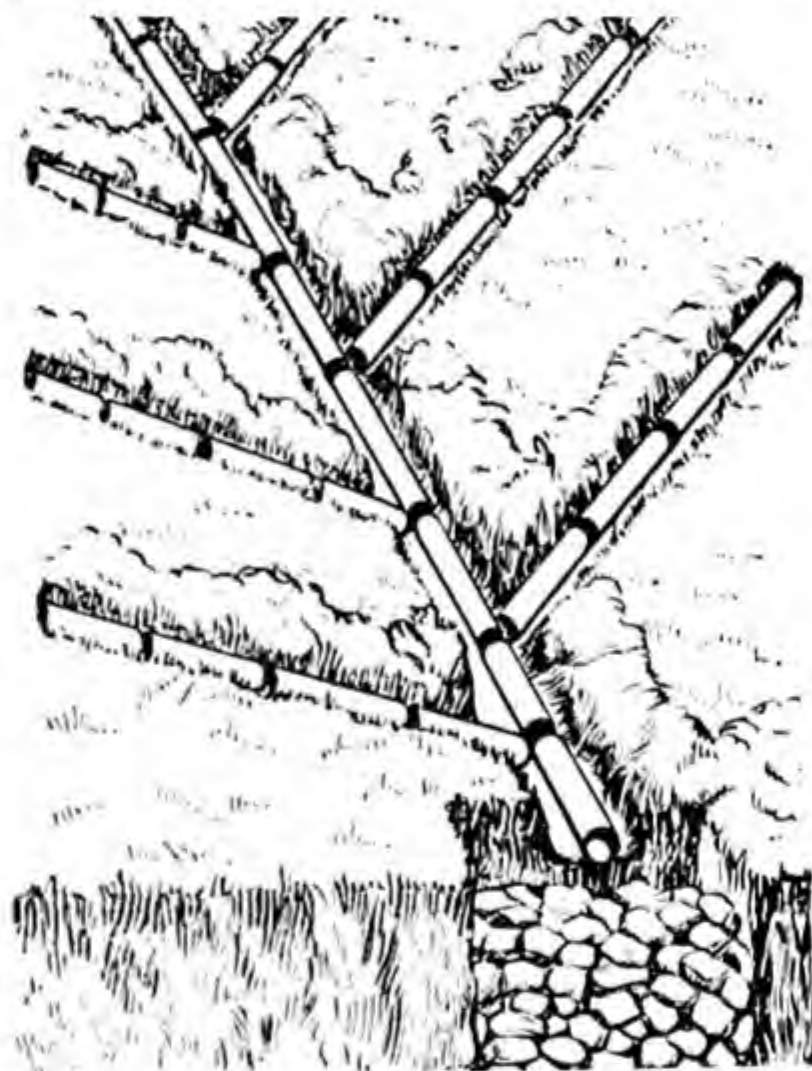
that the soil is chilled and growth is retarded.

Natural drainage is ensured by a sufficiency of coarse, gritty material or sand in the soil, also small stones and spongy organic matter or humus. Clay soils tend to be the most unsatisfactory as regards drainage, but bad drainage may also occur in soils which have a hard 'pan' beneath them. A pan, or layer of consolidated soil can occur as a result of repeated ploughing or other forms of cultivation which tend to consolidate the lower layers of soil. The remedy in this case is to break up the pan by deeper ploughing or other deep cultivation and so let the surplus water find its way through into the subsoil.

The drainage of clay soils can often be improved sufficiently by treating them with lime, which makes the finer particles of clay cling together into larger granules (see *Flocculate*), and also by further cultivation and the incorporation of bulky matter such as strawy manure, compost, leaf-mould and peat. Coarse sand and sharp boiler ashes are other useful materials for improving clay soils.

Sometimes cultural methods and soil dressings are not sufficient and drains must be installed to remove the surplus moisture. The most effective drains are those made with earthenware soil pipes laid end to end. The pipes should, for preference, be laid on a layer of gravel or coarse cinders and should be surrounded and covered with more of the same material. Trenches dug to receive land drains should have a slope in one direction, though it is not necessary for this slope to be more than 1 in 40. The drainage plan may be varied according to the site, but a convenient basic plan is that known as the herring-bone pattern in which there is a central drain running the length of the plot with side drains leading into it on either side. Whatever system is employed, the drain or drains should communicate at their lowermost point with some suitable outlet such as a stream, ditch, main drain or soakaway. The last-named is a large and deep hole filled with stones or clinkers. This soakaway will receive surplus water and allow it to percolate slowly into the subsoil.

An alternative to laying pipe drains is to dig narrow trenches in the same way as for pipe drains and partly fill them with stones brickbats or large clinkers between which water can flow. This layer of hard rubble should be covered with smaller stones, clinkers or gravel and then the trench should be filled with soil. A third system is to use bundles of brushwood laid in the bottom of the trenches and cover these with soil. Brushwood drains often last for a number of years, but may in time need to be replaced as the brushwood will decay and collapse.



Drainage pipes in a herring-bone pattern

DRAWN If a plant is grown in the dark or crowded together with many other plants or weeds, it will become excessively tall, thin and weak, a condition which the gardener describes as 'drawn'. Seedlings and young plants grown in greenhouses or frames are particularly subject to this fault, and it is for this reason that gardeners place pans or boxes of seedlings on shelves near the glass or raise them on inverted pots placed on the staging so that they get as much light as possible. It is also partly to avoid this danger that it is recommended that seeds be sown thinly and seedlings pricked off early.

DRILL A narrow furrow or groove made in soil for the purpose of receiving seeds which are to be sown in straight lines, as opposed to broadcast sowing. The act of preparing such drills is described as 'drawing drills' or 'drilling'. There are various ways in which this may be done. Frequently a draw hoe is used for the purpose, in which case it is held with one corner to the soil and pulled along in a series of smart but controlled jerks. Some gardeners prefer to use a dutch hoe held almost vertically and again one corner only presented to the soil. The hoe is then drawn smartly towards the body. For making small drills in frames or small beds a pointed stick is often used, and another useful method is to press a rake handle into the soil. There are also mechanical implements which will not only prepare the furrow, but also drop the seeds into it at regular intervals.

The important thing in all drilling is that the drills shall be of the same depth throughout and that this shall be the correct depth at which the seeds should be sown. Novices usually have a tendency to make drills which are too deep and vary in depth. The work is rendered much easier if the seed bed itself has been well prepared, and is even in texture and free from large stones. A garden line should be stretched tightly to mark the line of the drill and the tool which is to be used should be kept close against this line throughout. It will be found that if the tool, whether it be hoe, stick or mechanical implement, is operated firmly and rather rapidly it will be less liable to be deflected by small inequalities or obstacles in the soil.

For most seeds, drills should be no more than $\frac{1}{2}$ inch deep. For just a few large seeds such as those of peas and beans, drills of 1 to 2 inches deep are required.

When seeds have been sown in drills, they are covered by drawing back the displaced soil into the drill and this is best done either with a rake drawn diagonally across the drill or with a small stick or wood tally used on edge.

DROUGHT Officially a drought is any period of fourteen days or more without measurable rainfall. The gardener uses the



A seed drill

term loosely to describe any comparatively rainless period when plants show signs of suffering from lack of moisture. As plants absorb all nourishment from the soil in the form of solutions, it follows that water is of the utmost importance. It has been shown that in a normal southern English summer, the addition of 2 inches of artificial rain (by means of overhead irrigation) during the growing season, will double the crop of carrots and the same kind of thing is true of most other plants. It is therefore one of the gardener's first tasks to avoid drought. This he can do partly by digging soil deeply so that plants are encouraged to root deeply into layers of soil not so readily affected by sudden spells of dry weather; partly by working in plenty of bulky organic matter, such as dung and compost, which will retain moisture like a sponge, and partly by making provision for artificial watering during dry periods. Despite statements to the contrary, artificial watering is extremely valuable provided it is adequate and continuous during the period of draught. Trouble only arises when water is supplied in inadequate quantity or spasmodically, whereby roots are encouraged to grow near the surface and are then scorched when the soil dries out. Moreover it can be shown that a fine spray of water applied for an extended period is more

beneficial than a flood of water applied over a short period. It is for this reason that overhead spray systems of irrigation are so valuable.

It was at one time believed that mulching and hoeing helped to prevent drought by checking evaporation from the surface of the soil. Experiment has shown that this is not so, though both hoeing and mulching may assist in conserving soil moisture by killing weeds and so preventing unnecessary competition for available water supplies.

Some plants are adapted by nature to survive long periods of drought. Notable examples are cacti and other succulents which are able to store moisture in their thickened leaves or stems and so survive even under prolonged desert conditions.

DRUPE A fruit in which the seed is protected by a hard wall or stone as well as by flesh. Familiar examples are the plum and cherry. The individual sections of a blackberry, raspberry or loganberry fruit are also drupes.

DRY ROT A general name applied to various diseases which cause the dry decay of plants. One of the most familiar is the dry rot which attacks potatoes, particularly tubers in store. Dry, shrunken patches appear on the tubers with brown decay beneath and later whitish pustules form on these patches. All such tubers should be burned. Some varieties are particularly subject to it and should be avoided on that account. Dry rot of potatoes is most likely to be troublesome in a damp, badly ventilated store.

Another kind of dry rot attacks gladioli while they are in growth; the main stem decays just above the corm and as a result the leaves wither from the tips. Close examination will reveal the presence of many tiny black spots on the outer leaf sheaths near soil level. Small more or less circular, black spots will also be found on the corms. Affected plants or corms should be destroyed. Where the disease has occurred it is desirable to dip supposedly healthy corms in a solution of a suitable fungicide prior to planting. For this purpose Serisan,

a proprietary product, has been found satisfactory.



Potatoes affected by dry rot

DRY SET A physiological disorder of tomatoes which results in the fruits apparently setting but refusing to swell, each remaining no larger than a pin's head. Crop failures from this cause must not be confused with crop failures due to bud dropping, i.e. the whole flower falling off at the knuckle. Dry set is only likely to occur under glass when the atmosphere is too hot and dry. It may be prevented by syringeing the plants daily while they are producing flowers.

DWARF Some plant varieties are naturally smaller than the typical plants of the same species, e.g. the common juniper, *Juniperus communis*, grows to a height of about 30 or 40 feet but it has a variety known as *compressa* which seldom exceeds one foot in height and will take many years to attain even this dwarf stature. The dwarf character of these plants is a hereditary quality. Other plants may be dwarfed by artificial treatment though they are not genetically dwarfs. This is so with many of the tiny shrubs and trees familiar in Japanese gardens. Such plants are dwarfed by constricting and pruning their roots, starving them and so on.

With fruit trees, it is a notable and valuable fact that some of the stocks upon which garden varieties of fruit are grafted or budded have a dwarfing effect on the scions worked upon them. For exam-

ple Apple Bramley's Seedling is normally a very vigorous variety and if grown on its own roots or on a seedling crab stock it will make a tree 20 or 30 feet in height and at least as much through. But if this same variety of apple is grafted on the Paradise apple stock known as Jaune de Metz or Malling IX, it will only reach a height of 8 or 10 feet, with a similar spread, and this without any special treatment in the way of pruning or feeding. This dwarfing characteristic of certain stocks, can be used to great advantage to produce small trees in limited space, such as cordons, espaliers and dwarf pillars. (See *Stock*.)

EARTHING UP The process of drawing soil towards and round plants. It serves several purposes, including the blanching of stems, the covering of roots and tubers, and the provision of extra anchorage to secure plants during windy weather.

Earthing up with the aim of blanching is used for both celery and leeks and is an important item in the cultivation of these vegetables. With celery, earthing up must

be delayed until the plants are fully developed, for, after earthing up, they make little or no further growth. With leeks this is not so and earthing up is usually a progressive operation carried out at intervals during the summer and early autumn. Another point of difference is that with celery care must be taken to prevent soil working down between the stems into the hearts of the plants, whereas no such precaution is necessary with leeks. The usual method adopted with celery is to tie the stems together before commencing to draw soil round them.

Earthing up to cover tubers is usually adopted in the cultivation of the potato, though some experts believe that equally good crops and well-covered tubers are obtained without earthing up.

Earthing up to ensure improved anchorage is sometimes carried out with broccoli, cauliflowers and the taller varieties of kale. soil being drawn round the stems when they are well developed.

Earthing up is often done with a draw hoe which is used to pull soil from between



Earthing up potatoes

the rows towards the plants. This is the method almost invariably used when earthing up potatoes, broccoli, cauliflowers or kale. With celery a steeper and higher bank of soil is required and for this purpose a spade is commonly used, soil being dug from between the celery trenches and banked round the plants. The steep ridge formed in this way is usually smoothed off with the back of the spade. Occasionally when very large leeks are required for exhibition, earthing up is effected by placing a plank or planks on edge along each side of every row of plants and 4 or 5 inches away from them. The trough formed in this way is then gradually filled with fine soil.

EARTHWORMS In the main earthworms are of some benefit to the gardener. By tunnelling through the soil they help to aerate it and by dragging leaves and other vegetable matter into the soil they help to provide it with humus. In a series of famous experiments Charles Darwin observed that layers of stones that had been spread over fields of uncultivated soil were after a few years covered to a depth of one or two inches purely as a result of the activities of earthworms burrowing through the soil and throwing their casts on to the surface. Worms thrive in soils that are rich in humus, and are few in number in soils that are dry and sandy.

Earthworms do no direct damage to plants, but they may do indirect damage if admitted to pots or boxes containing small plants, for in these the soil disturbance they cause can interfere with root development. Worms can also be a nuisance on lawns, because the casts thrown on to the surface tend to be trodden down and, being rather sticky, they smother and kill the grass so causing small bare patches. Earthworms on lawns can be destroyed by spreading mowrah meal at the rate of 4-8 ounces per square yard and then watering very freely. The best time for this treatment is between February and May and again between August and December, particularly in damp close weather. The worms will come to the surface in a few hours and should be swept up at once. An alternative treatment is to dress the lawn with arsenate of lead at

the rate of 1½-2 ounces per square yard. This will clear lawns of worms for several years, but as arsenate of lead is a powerful poison, this treatment is not so safe as that with mowrah meal.

With pot-grown plants care should be taken to exclude worms from the potting compost and to prevent them entering through the drainage holes. This latter may be done by placing the pots on an ash pan.

EARWIGS Flowers and small seedlings are a favourite food of these creatures, and they can be very troublesome in the garden. Dahlias are particularly liable to be attacked, and the earwigs frequently hide themselves by day between the tightly packed petals of the flowers. Leaves that have been attacked often have a somewhat rusty, ragged appearance, while holes may be eaten in petals of a very similar type to those made by slugs and caterpillars.

Earwigs dislike daylight, and usually conceal themselves by day in dark crevices. If hollow broad-bean stalks, inverted pots lightly stuffed with hay, or slightly opened empty match boxes are placed among the plants, many earwigs will go into them by day and can be collected and destroyed. Bean stalks can be emptied by blowing through them. Alternatively earwigs can be killed by using a poison bait made by mixing ½ ounce of sodium fluoride with a pint of black treacle and 4 pounds of bran. First of all dissolve the sodium fluoride in a small quantity of water and the treacle in a little warm water. Then mix the two solutions together and add to the bran, mixing thoroughly and, if necessary, adding further water to make a moist but not wet, mash. This bait should be placed where earwigs can get at it but out of reach of domestic animals. Alternative remedies are to dust or spray the plants with DDT or BHC insecticide,

EDGING IRON A tool with a straight handle and a half-moon blade used for cutting the edges of lawns.

EELWORMS A general name given to a number of different species of nematode worms. Most eelworms are microscopic in size and all are transparent and eel-like in

shape. By no means all species are plant pests, in fact some of the larger nematode worms are mainly scavengers, but there are numerous eelworms which live within the tissues of plants, weakening them and usually producing withering or distortion of stems and leaves. One species attacks chrysanthemums by ascending the plants from the soil, swimming up the moisture on the outer skin to enter the leaves by way of the breathing pores. As a result the leaves develop purplish patches between the veins and these later turn brown, so that the whole plant may present the appearance of withering from the base upwards. Another species attacks phlox causing the stems to become puffy or 'gouty' and the leaves to become curled, divided or extremely narrow. Badly attacked plants are completely stunted. Yet another common species of eelworm attacks potatoes, causing the plants to become weak and yellow and produce little or no crop. Close examination of the roots and tubers will reveal the presence of small whitish specks or cysts on them. Narcissi are also subject to attack by a particular species of eelworm and in these plants small thickened patches are formed on the leaves and can be felt if a leaf is drawn between forefinger and thumb. The leaves become distorted and develop pale green or yellowish streaks. Tomatoes are subject to attack by an eelworm which lives in the roots and forms galls or nodules on them for which reason it is called the root-knot eelworm. Plants are progressively weakened.

As all the eelworms spend at least a part of their time in the soil, soil sterilization is a possible means of controlling them, but is usually only practicable under glass. For this purpose steam may be used, or a chemical such as cresylic acid or DD (the abbreviation commonly used for the chemical named dichloropropane). The last appears only to be effective against the root-knot eelworm of tomatoes. Outdoors, rotation of crops is a possible means of keeping down the eelworm population. Clean phlox plants may be produced from affected plants if the roots only are employed as cuttings and the stems thrown away. Clean plants raised in this way must

not be replanted in the same eelworm-infested soil. Chrysanthemum plants that are to be used for propagation but are suspected of being infested with eelworm may be 'sterilized' by placing them for 5 minutes in water at a temperature of 115 degrees F. If potatoes develop eelworm, no further potato crop should be grown on the same site for three or four years. If seed potatoes are suspected of being infested they should be washed thoroughly before being planted. If a crop of mustard is grown on the ground and dug in just before coming into flower, some reduction in the number of eelworms may be expected. Narcissus bulbs that are infested may be 'sterilized' in the same way as chrysanthemum stools, i.e. by placing them in water at a temperature of 110 degrees Fahrenheit for 3 hours.



Emasculation

EMASCULATION The act of removing the anthers from a flower to prevent it from becoming fertilized with its own pollen. It is often a necessary preliminary to cross-fertilization (*q.v.*).

EMBRYO The earliest stage in the development of multicellular living organisms. In botany the term is applied to the rudimentary plant within the seed.

ENTOMOLOGY The name given to the scientific study of insects. A person who practises this science is, therefore, known as an entomologist. Since many plant foes are insects, it is usually the case that the scientist who makes plant foes his special study is also an entomologist, but it by no means follows that the name is confined to the study of harmful insects.

EPIDERMIS The outer skin or covering of a plant. In woody plants the epidermis is later replaced by the bark of branches and trunk.

EPIPHYTE A plant which grows upon another plant without actually being a parasite upon it. Many orchids are epiphytic, growing in the branches of trees but obtaining their nourishment from the air and from decaying matter collected in crevices of the bark.

ESPALIER A system of posts with wires strained horizontally between them and used for the training of fruit trees. A good espalier will have a stout upright every 10 feet, the upright being embedded at least 2 feet in the soil and standing at least 5 feet out of it. Horizontal wires will be trained at intervals of about 15 inches from bottom to top of these posts and the wires themselves should be no thinner than 10 gauge. The end posts of the espalier should be further supported by diagonal stays so that the wires can be strained really tight without displacing the posts.

The usual method of training fruit trees on such espaliers is that known as horizontal training in which the main stem or trunk is trained vertically and from this side branches are trained to right and left horizontally along each wire. Such horizontally-trained fruit trees are often erroneously referred to as espaliers; in fact this term applies to the training fence and not to the trees, though the trees may correctly be referred to as espalier-trained trees.

Espaliers are often used as a dividing line between one part of the garden and another in place of an ornamental hedge. In old gardens they may often be seen as a dividing line between vegetable beds and paths.

When several rows of espaliers are placed in one plot they should be spaced at least 6 feet apart and should, for preference, run north and south so that the trees trained upon them do not shade one another unduly.

ETIOLATED Blanched. A term used to describe the pale, thin and elongated growth produced by plants grown in the dark.

EUROPEAN GOOSEBERRY MILDEW, see *Gooseberry Mildew*.

EVERGREEN Any plant which retains its leaves throughout the year, in contrast to a deciduous plant which loses its leaves and then, after a period of dormancy, produces a fresh set. However even evergreens do shed their leaves and produce new ones, though the process is more or less continuous and there is no time at which the plant is bare.

Evergreen trees and shrubs play an important part in the furnishing of the garden, particularly since they will provide foliage at all times of the year. Too great a reliance on evergreens can however give a heavy appearance to the garden and they should be suitably interspersed with deciduous types.

Evergreen trees and shrubs are of many different kinds and no general treatment can be prescribed to suit all, but one feature which most have in common is that, because, unlike deciduous trees and shrubs, they have no marked period of dormancy, they cannot be transplanted while dormant. Experience proves that, in general, evergreens, with the exception of evergreen conifers, transplant most satisfactorily either in early autumn (September, October) or in spring (April, May). Evergreen conifers can be transplanted successfully between November and March like deciduous trees and shrubs.

EVERLASTING A popular though slightly misleading name for certain flowers, which, because of their dry and chaffy petals, can be kept for a long period. Familiar examples are statice and heli-

chrysum. Evergreen flowers of this character should be cut just before they reach their maximum development. They should be dried by tying the stems in small bundles and hanging them head downwards in a cool airy shed where they are not directly exposed to sunshine. Frequently the dry stems have not sufficient strength to carry the rather heavy flowers and must be replaced by wires.

EXHIBITION The term is occasionally used by gardeners to distinguish certain varieties of flowers, fruits or vegetables particularly suitable for showing, from other varieties of the same kind of flower, fruit, or vegetable which are principally of value for garden decoration or table use. For example violas are frequently classified as exhibition or bedding, according to whether they have the large, perfectly formed flowers required for show purposes or the tufted free-flowering habit so desirable for garden display. In the same way chrysanthemums, dahlias and roses are sometimes divided into exhibition and garden categories.

EXHIBITION BOARD At one time many flowers were displayed for show purposes on boards, the dimensions of which were carefully specified by the rules. Present-day tendency is towards more informal methods of display, but boards or boxes are still used for roses, chrysanthemums, dahlias, violas and show pinks.

The sizes of boards for chrysanthemums are specified by the National Chrysanthemum Society as follows: for 12 large exhibition blooms, the board should be 28 inches long, 21 inches wide, 7 inches high at the back and 4 inches high at the front. Holes should be drilled in this board, 7 inches apart and $3\frac{1}{2}$ inches from the edge of the board—each hole to take 1 metal tube in which the flower stem can be placed. Alternatively, a bigger board may be used in which the holes are 10 inches apart.

The sizes of exhibition boards for roses are fixed by the National Rose Society as follows: for 24 blooms the board is to be 3 feet 6 inches long and 18 inches wide and

for 18 blooms it is to be 2 feet 9 inches long and 18 inches wide; for 12 blooms it is to be 2 feet long and 18 inches wide and for 9 blooms, 18 inches long, 18 inches wide; for 6 blooms it is 1 foot long and 18 inches wide. These boards are usually made up into the form of a box with a lid which can be closed over the blooms to protect them on their way to the show.

EXsertED Projecting; a botanical term sometimes applied to stamens or pistils which project beyond the other parts of a flower.

EXOTIC Any plant which is not a native of the country. The term is often used erroneously, as though it applied only to tender plants, but this is by no means the case. Many exotics are actually hardier than natives because they come from countries with a colder climate.

EYE A term used in several distinct ways by gardeners. It may be applied to the centre of a flower when differently coloured from the remainder of the bloom; to the growth bud of a tuber, e.g. the 'eyes' of a potato; or to a single growth bud removed from a stem usually with a portion of the stem or surrounding bark, for the purpose of propagation. Eyes, or single bud cuttings, of this last-named type are sometimes used to increase grape vines. They are treated much like ordinary cuttings except that they are usually inserted horizontally



Vine eyes to be started into growth

with the eye uppermost and barely, if at all, covered.



The eyes of a potato

FAIRY RINGS A popular name given to a fungus which attacks grass, weakening but not as a rule, killing it. The fungus spreads slowly in the form of a ring and the grass immediately outside the ring is stimulated so that it grows more luxuriantly and assumes a darker green colour. It is this phenomenon which gave rise to the country name of fairy ring. Toadstools often appear round the outside of the ring. The remedy is to water with sulphate of iron at 4 ounces per gallon of water.

FALLOW The practice of allowing ground to lie idle for a period so that its fertility may be increased by natural processes such as the action of wind, rain and frost and the activity of soil micro-organisms, including bacteria. Fallowing is more common as an agricultural than as a horticultural practice and at one time formed a regular part of the farmer's cycle. It is, perhaps, of greatest importance in gardens when soil has become infected with some disease-causing organism, or is heavily infested with a plant pest. Familiar examples are club root disease of brassicas and the cyst-forming eelworm of potatoes. With these it often pays to leave the ground vacant for a period, or at least not to grow any crop on which the pest or disease-causing organism can thrive.

FALLS The sepals of certain types of iris which hang downwards in contrast to the petals which stand up and form that part of the flower known as the standards (*q.v.*).

FAMILY A group of related genera. See *Classification*.

FANCY In a wide sense this term is used to denote the general body of breeders of any plant, or for that matter animal, specifically for show purposes; e.g. one may speak of the 'pigeon fancy' with reference to the practice of breeding pigeons specifically for show purposes and of the 'rose fancy' in a similar sense. It has, however, a more particular application in horticulture, to flowers, and particularly show flowers, with variegated markings. A familiar example is the 'fancy' carnation which is always a variegated bloom in contrast to the 'self' carnation in which the flower is of one colour throughout.

FARINA The powdery covering on the stems and leaves of some plants as, for example, those of the auricula and of *Primula pulverulenta*. This powdery covering is usually white, though occasionally bluish or yellowish in colour, and may add considerably to the attraction of the plant.



A fasciated flower stem

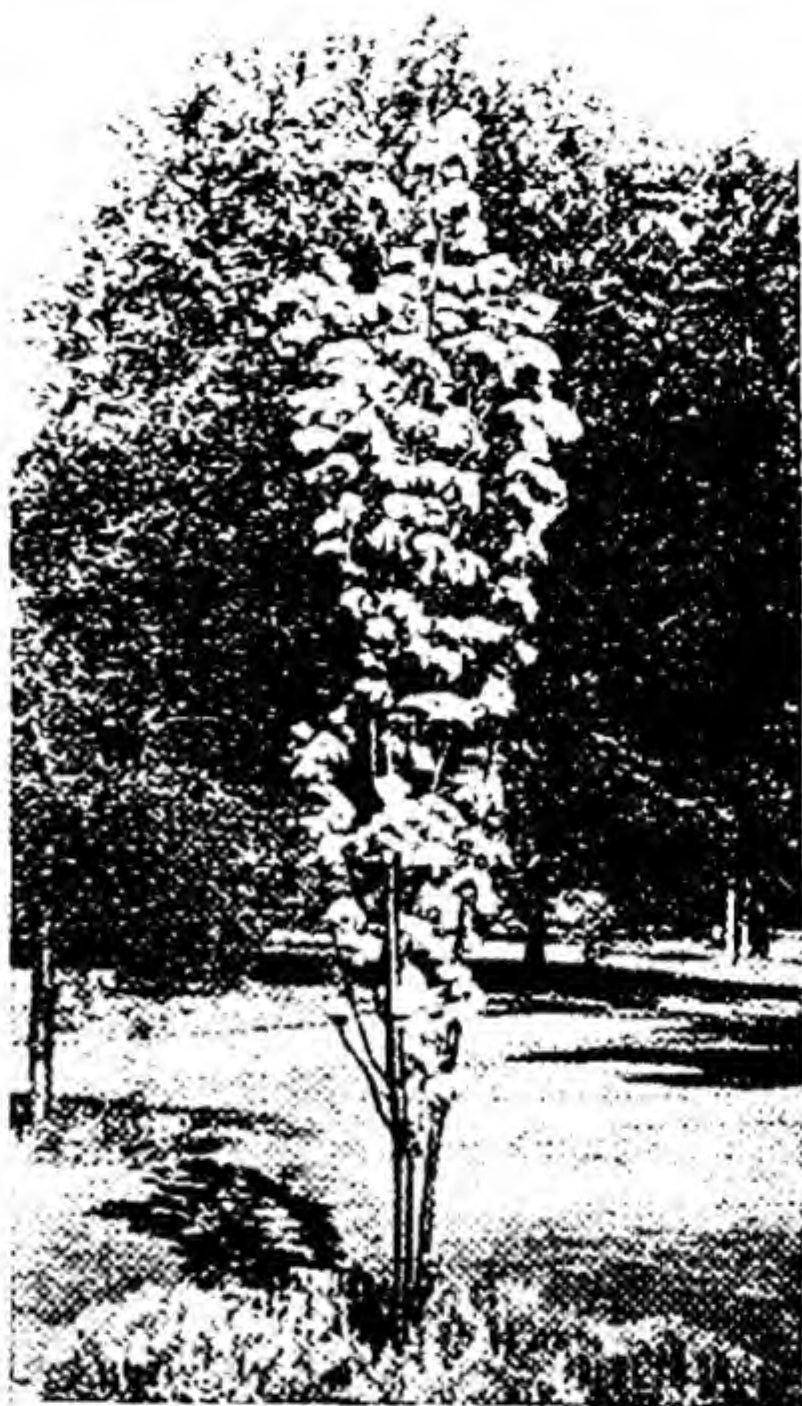
FASCIATION A condition in which several stems become fused together, the effect being of one stem of abnormal width and often carrying an exceptional number of flowers. This is a freak which is common in certain plants and in some seasons. It appears to be encouraged by conditions which favour very rapid growth, as for example an exceptionally rich soil or very mild and warm weather. Extraordinary examples of fasciation, in which many stems are fused together, are occasionally seen in delphiniums and some species of lily. Nothing can be done to prevent this freak, and it is possible that a plant which suffers from it in one year will be quite free from it the following year.

FASTIGIATE A botanical term meaning erect in habit. It is applied chiefly to trees and shrubs which in normal forms have spreading branches, but in particular varieties have branches which are upright. Two familiar examples are the Lombardy poplar, which is a fastigate form of the black poplar, and the Irish yew, which is a fastigate form of the common yew.

FEATHERED A term sometimes applied to year-old (maiden) fruit trees which besides forming a main stem, have produced some side growths. These side growths are colloquially known as 'feathers'.

FEMALE FLOWER A flower which bears pistils but no stamens, in contrast to a male flower which bears stamens and no pistils, and a hermaphrodite flower which has both pistils and stamens. Familiar examples are to be found in the vegetable marrow and the cucumber, both of which bear some flowers which are female only and some which are male only. In both these examples the female flower can be distinguished very readily because immediately behind it is an embryo fruit, recognisable as a rudimentary marrow or cucumber, whereas the male flower has no such embryo behind it but only a slender stem.

FERBAM The popular name of ferric dimethyl dithiocarbonate, a chemical much used in America as a fungicide. It is a black salt of iron which when sprayed on plants



A fastigate prunus

leaves a dark deposit which may be rather disfiguring. It is said to give good control or black spot disease of roses and some other diseases including rusts and leaf spots but it has not found much favour in Britain.

FERTILE That which is able to produce abundantly. The term is used by gardeners both to describe varieties of plants which are able to produce good crops in contrast to other varieties of the same kind of plant which do not produce so abundantly, and also to describe soils which are rich, in contrast to those which are poor. The term self-fertile, frequently applied to certain varieties of fruit, means that these varieties are capable of producing abundant crops when fertilized with their own pollen, in contrast to self-sterile varieties which will not produce crops unless fertilized with pollen from another tree or bush of the same kind, but of a different variety.

FERTILIZATION The union of two cells of opposite sex to produce a new individual. In flowering plants fertilization is effected by the growth of a pollen grain down the pistil of a flower until it fuses with the ovule. As a result a seed is formed and this on germination produces a new plant. Fertilization is not only important as a means of producing new plants but from the gardener's standpoint it is also important as a means of producing fruits as many plants will not develop their fruits unless fertilized. The problem is further complicated by the fact that, though some plants are self-fertile, i.e. they will produce seeds and fruits from a union between their own pollen and ovules, others are self-sterile, i.e. they will only produce seeds and fruits from another variety of the same kind of plant. Many special precautions are taken to ensure thorough fertilization of some crops. Fruit growers import hives of bees to their orchards to ensure a thorough distribution of pollen from flower to flower and they also plant different varieties of the same kind of fruit near together to ensure cross-fertilization. Under glass the flowers of peaches and nectarines are lightly dusted with a camel's hair brush or a rabbit's tail tied to a stick to scatter the pollen, and the atmosphere of such houses, and also of vineries, may be allowed to become a little warmer and drier than usual to allow the pollen to become thoroughly ripe.

Plant breeders carry out their controlled fertilizations of particular flowers by emasculating the intended seed parents some time in advance and covering these prepared flowers with paper, cellophane or muslin bags to protect them from chance fertilization; and by then bringing the chosen pollen to these flowers on a camel's hair brush when the stigmas are sticky and in a suitably receptive condition.

Melon growers take great care to fertilize a specified number of female flowers per plant all at one time, doing this by plucking well-developed male flowers and scattering the pollen from them over the stigmas of the female flowers. Ridge cucumbers and vegetable marrows are fertilized in a similar manner except that there is no restriction of the number of female flowers treated per

plant. Curiously enough greenhouse cucumbers are not fertilized as they will produce better, seedless fruits without this. Such fruits are said to be parthenocarpic. Similar results can be produced in certain instances by treating the flowers or tiny fruits with a suitable hormone and such hormones are much used for getting a good set of fruit on the bottom trusses of tomatoes.

Frost and bad weather may seriously affect the fertilization of fruit blossom outdoors and it is for this reason that it is advised that fruit trees should not be planted in hollows and valleys in which cold air is apt to collect. Weakness and lack of available plant food in the soil, particularly readily available nitrogen, may also adversely affect the fertilization of fruit trees.

FERTILIZER Any substance used in fairly concentrated form as a plant food in contrast to bulky manures such as dung, compost, sewage sludge and seaweed. Popular fertilizers are sulphate of ammonia, nitrate of soda, dried blood, hoof and horn



Tulip fire disease

meal, bonemeal, basic slag, superphosphate of lime, sulphate of potash and muriate of potash. See *Organic* and *Inorganic*.

FILAMENT The slender stalk which bears an anther.

FILLIS Soft string used for tying.

FIMBRIATE Fringed; a botanical term applied to petals with fringed margins.

FINGER AND TOE An alternative name for club root disease (*q.v.*).

FIRE (TULIP) A disease of tulips caused by a fungus which attacks both leaves and flowers, causing them to become brown and withered as if they had been burned. Sometimes the whole plant may be destroyed. This is an extremely difficult disease to control and as a rule frequent applications of a fungicide are required during the time that the plant is making its growth, i.e. from about March to May. Colloidal copper is fairly effective, but a proprietary fungicide called Tulisan has been reported to give even better results.

FISH REFUSE All animal matter is capable of decaying in the soil and producing humus in the process, in addition to liberating plant foods, and fish is no exception to this rule. Fish waste is, in consequence, a useful manure. Fresh fish waste can be used, but is a rather unpleasant substance to handle unless it can be dug in directly it is received. Where fish scraps can be purchased cheaply it is good policy to keep a trench open on a vacant plot of ground, spread the scraps in this trench as received and cover at once with soil. Large quantities of fish waste are also dried and prepared in various forms, sometimes with the addition of other chemicals and then sold as fish guano, fish manure, etc. All such preparations are valuable garden manures which should be used strictly in accordance with manufacturer's instructions as they may vary greatly in strength. No general analysis can be given though a plain sample of dried fish waste to which no chemicals have been added is likely to con-

tain between 8 and 10 per cent. nitrogen, $4\frac{1}{2}$ -9 per cent. phosphoric acid and 2-3 per cent. potash. Such plain dried fish manure may be used at the rate of 3 to 4 ounces per square yard in late winter and early spring. Undried fish waste should be used at rates varying between 1 cwt. to 6 square yards and 1 to 24 square yards.

FLAKED A term used by exhibitors and plant fanciers for certain varieties of flowers in which two colours are combined in broad streaks or bands. e.g. flaked carnations are bicoloured varieties which can be compared with fancy carnations but differ from them in the bolder and broader markings of the flowers.



A flaked carnation

FLEA BEETLE Very small black or dark coloured beetles which live on the leaves of cabbages and other members of the cabbage family (*cruciferae*) including turnips and radishes. The beetles make small round holes in the leaves and when disturbed they jump vigorously—hence the popular name. Seedlings are most liable to be attacked but damage can be done to plants of any age. Complete control can be effected by dusting the plants with $2\frac{1}{2}$ per cent. DDT or with gamma-BHC.

FLOCCULATE To join small particles together into larger granules. Horticulturally this term is used to describe the pro-

cess of improving the texture of a clay soil by giving it a coarser and more porous structure. This effect may be produced by treating such soils with lime and also by dressing them with certain other materials such as Krilium and alginates. (See *Lime* and *Soil Conditioners*.)

FLORE PLENO A botanical term used to describe flowers which are 'double', that is to say, which have more than the characteristic number of petals, e.g. the familiar double-flowered form of *Gypsophila paniculata* is botanically known as *Gypsophila paniculata flore pleno*.

FLORET One of the individual flowers which make up the head of a composite flower as in the daisy. The florets which form the cushion-like centre of a composite flower are known as disk florets, while the outside florets which carry ornamental petals are known as ray florets.

FLORIST In a wide sense anyone who deals in flowers or produces floral designs is known as a florist, but the gardener uses the term in a more restricted sense to designate a cultivator of those flowers which have been specifically developed for show purposes in distinction to flowers which are used mainly for garden or household display, e.g. certain forms of roses, dahlias, chrysanthemums, gladioli, auriculas and tulips may all appropriately be described as florist flowers.

FLOWER POT A receptacle in which plants can be grown, provided with a drainage hole or holes and taller than it is broad. Flower pots are commonly made of earthenware, but are also made of many other materials including glass and specially treated paper. Earthenware flower pots are made in many different sizes and these can be described in two different ways, either according to the diameter measured inside across the top of the pot or to the number of pots baked at one time on a potter's tray or cast, e.g. 60's describes a comparatively small pot of which 60 can be baked at a time on a cast, whereas 8's denotes a comparatively large pot of which only a few can be baked at a time on the

cast. A few sizes of pots have acquired what are often regarded as nicknames, e.g. very small pots are known as 'thimbles', those slightly larger as 'thumbs', while a particular type of 3 inch diameter pot of rather greater depth than normal is known as a 'Long Tom'. The table below shows the correlation between these methods of designation.

Number to cast	Inside diameter at top (inches)	Outside depth (inches)
72 (small) thimble	1½	2
72 (medium)	2	3
72 (large) thumb	2½	3
60 (small)	3	3¼
60 (medium)	3½	3½
60 (large)	3¾	4
54 (small)	4	4½
54 (large)	4½	4½
48 (small)	4¾	4¾
40	5	5
40	5½	5½
32	6¼	6¼
28	7	7
24	7½	7½
16	8½	8½
12	10	10
8	11	11
6	12½	12½
4	14	14
2	15½	15½
1	18	18

Pots are also made of treated paper, pressed peat and other materials with a comparatively short life, the idea being that the pot is discarded when planting out. See also *Soil Blocks*.

FLUE DUST The sweepings from factory chimneys in which the boiler has forced draught. Because of the intense heat much of the nitrogen, which is present as sulphate of ammonia in ordinary soot, is driven off and frequently the resultant dust has little or no garden value. A few samples, however, contain appreciable quantities of potash, as much as 8 per cent occasionally. Flue dust should only be purchased where an analysis is available. A sample with 1 per cent of potash would be worth one-fiftieth the price of sulphate of potash. Better samples can be calculated accordingly.

FLUSH A plentiful supply. Often applied to mushrooms, roses, etc., which tend to crop intermittently.

FLY A general term used by gardeners, not only for a number of genuine flies which are pests in the garden, but also for some insects which are not flies at all. Among the latter may be mentioned the black fly and the greenfly, both of which are aphides; the white fly which is closely related to the scale insects and superficially is more like a tiny moth than a fly, and the frog fly which resembles an aphid rather than a fly.

Among genuine flies which are troublesome in the garden the most important are the cabbage root fly, carrot fly, celery fly, mushroom fly, narcissus fly, marguerite fly (see *Leaf Miner*), onion fly and crane fly. Without exception it is the maggots (larvae) and not the flies themselves which cause the damage and, in many instances, they do this by boring into the roots or, with the narcissus and onion flies, into the bulbs of the plants attacked. Some, such as the celery fly and the marguerite fly, produce maggots which tunnel their way through the leaves, in consequence of which they are usually referred to as leaf miners. These various pests are dealt with in greater detail under their particular names.

Sawfly is a name given to various small, fly-like insects which are more closely related to wasps than to the familiar house fly. The maggots of all these sawflies feed on plants, usually on the leaves or stems. Among the most troublesome are the apple sawfly (a fruit eater), the currant sawfly, the gooseberry sawfly and the rose sawfly.

FOOT ROT A name given to a bacterial disease of cucumbers, melons and tomatoes. It attacks the main stem of the plant, usually just above soil level, though occasionally higher up. The damage closely resembles that caused by the diseases known as collar rot and damping off, though these are caused by a totally different organism. As a result of the decay the upper part of the plant is deprived of sap and quickly collapses.

The most effective remedy is to keep the

base of the plant rather dry, and to make it easier to do this, it is a good plan to plant on small mounds of soil and place a metal collar around the base of each plant to prevent water splashing on to it. Some gardeners plant out their cucumbers and melons in the small pots in which they have been raised, merely knocking off the bottom of each pot so that the roots can grow out into the new soil. The pot is allowed to project an inch or so above the surface of the bed and so this acts as a collar or shield to keep the base of the plant dry.

If the disease occurs, despite precautions, affected plants should be removed and burned and the bases of any nearby plants dusted with a mixture of 3 parts of flowers of sulphur, 3 parts of finely powdered copper sulphate and 10 parts of hydrated lime.

FORCING The practice of hurrying plants into growth, flower or fruit by the application of heat or some other means. A forcing house is a greenhouse or shed specially designed for this class of work.

Some subjects force more rapidly and readily in the dark. This is notably so with rhubarb, which is often forced under the greenhouse staging, in warm sheds or even in cellars. Sea-kale, dandelion and chicory are forced in the same way and for these plants, the darkness has the additional advantage that it blanches the stems, which is necessary to make them palatable.

Forcing Bulbs It is most important that before bulbs are introduced to heat, they should be given a period during which they can develop an adequate root system; with narcissi, tulips and hyacinths, this is ensured by plunging the pots or other receptacles containing the bulbs, in a cool place outdoors, for a period of at least eight weeks before they are introduced to a greenhouse. Sand, sifted ashes or peat are materials commonly used for plunging and the pots or boxes are completely covered to a depth of 2 or 3 inches. Other bulbs are not plunged but are placed in an unheated frame or sheltered place outdoors for a similar period before being forced.

With some bulbs, it has been found that treatment prior to planting can have a marked effect on the speed of growth when



Forcing sea kale

they are forced, e.g. daffodils, if placed in cold storage for a period of several weeks in August and September, will force much more rapidly than untreated bulbs. With tulips and hyacinths a rather higher temperature has been found to produce the same result and some commercial growers have found it worth while to install large refrigeration plants for pretreatment of bulbs in these ways.

Another method is to retard growth for a period and then bring plants into warmth. This produces remarkable results with some kinds of plants and is much used for lily of the valley. Selected crowns, lifted during their period of dormancy in winter, are placed in cold store and so prevented from growing at their normal time the following spring. They are kept in cold store throughout the spring and summer and are then potted and brought into warmth in the autumn. Growth is very rapid and flower spikes are produced within a few weeks.

Bulbs that have been forced are usually so much weakened by the process that they are either of very little use afterwards or else must be allowed several years of normal culture before being forced again.

Forcing shrubs Many shrubs, including roses, are potted and brought into the greenhouse for forcing. Only strong, well-

grown plants should be used for this purpose and it is an advantage if they are really well established in the pots before they are forced. The plants in their pots are grown in the open for most of the year, usually with the pots plunged to their rims in a bed of sand or ashes to reduce evaporation. They are brought into a cool greenhouse in the autumn or early winter and are only subjected to a really warm atmosphere for the last few weeks before flowers are required. Indian azaleas, *Deutzia gracilis*, lilacs, *Prunus triloba*, and *Cytisus fragrans* are popular subjects for forcing in this way. Provided great heat is not used and the plants are well looked after during the summer, being properly and regularly fed, watered and pruned, they will not suffer in constitution and can be gently forced several years in succession. After hard forcing, however, a prolonged period of recuperation may be required.

FORK Several different kinds of fork are useful to the gardener. The two most familiar are the digging fork, usually with four 'tines' or prongs, which are square in cross section, and the hand fork, which is similar to a trowel but with three or four prongs instead of a solid blade. A digging fork can be used for many tasks besides digging. It is, for example, one of the best tools for breaking down large clods of soil after winter weathering for which purpose it is used with swinging, sideways blows. It is also quite a useful tool for lifting potatoes and other crops, though some gardeners prefer for this purpose a special lifting fork with tines which are slightly more curved than those of a digging fork and round instead of square in section. A similar fork, but with five instead of four round sectioned prongs, is also useful for spreading manure, compost, etc. Another type of fork is that with flat, rather broad tines, usually four in number. This is specially useful for digging the lighter types of soil which would pass too readily through an ordinary square tined, digging fork. A border fork is really a small digging fork and is sometimes known as a lady's fork. It is most useful for light work and for loosening the soil round growing plants, as for example

in the herbaceous border. A hand fork can also be used for this purpose, particularly in confined spaces, as between seedlings, or in the rock garden. A hand fork is also useful for lifting seedlings that are to be transplanted and for removing weeds. These small hand forks are now often made of aluminium alloy with the handle and tines all cast in one piece. All the larger types of fork may be manufactured with either T or D handles. Most gardeners prefer the latter on the score that they are more comfortable to use.

FORKING The practice of breaking up ground with a fork. It differs in no essential respect from digging and on many heavy soils a fork is a better tool to use than a spade for digging. A fork is not, however, a suitable tool with which to fork up or turn over the top spit of ground covered with turf or dense weeds, as for both these it is necessary to have the blade of a sharp spade with which to chop through the grass or wood roots so that the soil can be lifted cleanly and easily.

FORMAL GARDEN A somewhat vague term used to describe any garden or part of a garden which is designed on set lines, with balanced beds of more or less geometrical pattern, in contrast to an informal garden in which the lines are more flowing and irregular and the balance less obvious. No hard and fast rules can be laid down and every kind of intermediate exists between the completely formal garden, as exemplified by the old English 'knot' gardens in which elaborate beds were con-

fined by closely clipped edgings of box, to the completely informal or 'wild' garden which became so popular towards the close of the nineteenth century.

FORMALIN The commercial name for the 40 per cent. solution of formaldehyde gas in water, usually sold for horticultural purposes. It is a useful chemical with which partially to sterilize soil which has become infected with disease-causing organisms (see *Sterilization*).

Formalin is also used as a disinfecting agent for certain seeds, particularly those of celery which has suffered from leaf spot, a seed-borne disease. The seed is soaked for 3 hours before sowing, in a solution made by adding 1 teaspoonful of formalin to $\frac{1}{2}$ gallon parts of water.

FRAME A structure which can be covered by removable 'lights', glazed with either glass or glass substitute.

Frames are of many different types and sizes. The old-fashioned garden frame was usually made to accommodate 'lights' measuring 6 feet \times 4 feet, each light being made with several sash bars and glazed with numerous panes of glass, generally about 10 inches broad and 12 inches deep. This type of frame is still much used, but is being replaced for many purposes, particularly in commercial gardens, by the Dutch frame, which is designed to take lights measuring 62 inches \times 25 inches and glazed with one pane of glass. Dutch lights are much lighter than the old-fashioned English lights and can be handled by one person. Moreover, as they have no sash bars, they transmit more light, which is better for the plants growing beneath them. Smaller frames for private gardens, are often made to accommodate lights measuring 3 feet \times 4 feet, each with several sash bars and glazed with comparatively small panes of glass as in the 6 feet \times 4 feet lights.

The lights may be made of wood or metal, but wood is still the more popular material as there is some difficulty in manufacturing a metal light which has no tendency to whip when lifted by one corner, as it may have to be when it is raised for inspection of the plants, watering, etc.



A formal garden

Frames are as varied as the lights used to cover them. They may be portable or permanent, made of brick, wood, metal or turves. The old-fashioned garden frames usually had brick walls about 1 foot high in front and 18 inches to 2 feet high at the back. They were provided with broadly-rabbeted cross members on which the lights could be slid easily backwards or forwards, for both ventilation and inspection of the plants. Small frames for private gardens are often made with a hinged light which can be thrown right open but cannot be removed from the frame. Dutch lights are often used on improvised frames which can very readily be taken to pieces and erected elsewhere. These may be made of one-inch-thick planks on edge, bolted or screwed to 2 inches \times 2 inches uprights driven into the ground. As a rule no cross members are provided. Frequently, the walls of these Dutch frames are the same height front and back and the necessary tilt to run off rain is secured by banking up the soil on which the frame is placed. This method has the advantages that all plants can be the same distance from the glass and that, if the tilt is towards the south, the frame receives maximum illumination with the minimum amount of shade thrown by the walls.

'Cold' frame is the name given to any type of frame which is not heated.

Propagating frame is the name given to any frame specially reserved for the propagation of plants and particularly for the germination of seed and the striking of cuttings. As a rule, propagating frames are comparatively small, often with only one light, and they must always be well made so that, when the light is in position, the frame is practically airtight. This is necessary to ensure the close atmosphere essential for the propagation of some plants. Such frames are often placed within the greenhouse for additional protection and may have hot water pipes or other heating apparatus placed beneath them to produce bottom heat (see page 29).

A sand frame is a particular type of propagating frame in which pure sand is used in place of soil or a mixture of soil, sand, peat, etc. It is a device developed for the rooting of certain rather difficult cut-

tings, particularly those of some shrubs. The sand frame is often placed in full sunshine and is not shaded at any time. In order to prevent the cuttings flagging under such conditions frequent watering is necessary even to the extent of three or four times per day. It is obvious that such a device is of more service to the professional gardener who can give his whole time to the work, than to the amateur who may have to be away from his garden for fairly long periods.

A Paris frame is a small frame within a larger frame and may be regarded as a variation of the propagating frame placed within a greenhouse.

Frames fulfil three distinct functions in the garden. They provide a means of hastening the germination of seeds or the rooting of cuttings and are thus valuable to the propagator. They enable the gardener to obtain certain crops at times when they could not be obtained out of doors, and this is particularly true of early supplies of such things as lettuces, radishes, cucumbers, French beans, vegetable marrows, beet-roots and carrots. Lastly they provide a convenient method of hardening off plants which have been raised in a greenhouse and are to be grown on in the open air.

In general, the best aspect for a frame is one that is open to the south but has some shelter from the north and east. If a greenhouse is included in addition to frames in the garden equipment, it often pays to have at least some of the frames against the south or west wall of the greenhouse as in this position the frame will get a certain amount of protection and some warmth if the greenhouse is heated.

Frames which are mainly used for accommodating plants grown in pots, pans or boxes are best provided with a floor of sifted boiler ashes or shingle as these materials will retain an adequate amount of moisture without encouraging insects or worms. Frames in which plants, cuttings or seeds are to be grown in a bed of soil should be filled with a suitable compost (see page 58). Concrete is seldom a satisfactory material as a floor for frames because it will not hold moisture and reflects sun heat too strongly.

The warming of frames can be carried out in a variety of ways. Hot water pipes may be passed through them as in the case of greenhouse heating. They may be equipped with electrical air heaters or electric soil-warming cables may be buried in the soil and heated from beneath. An old-fashioned system which still has much to commend it is the hotbed (*q.v.*).

FRENCH GARDENING A term sometimes used to describe intensive vegetable cultivation making use of cloches and frames.

FRIABLE Easily broken up. A term used to describe soil that is in the right condition to be broken down to a fine, crumbly state.

FROG HOPPER Another name for the insect commonly referred to as 'Cuckoo Spit', (*q.v.*).

FROND The 'leaf' of a fern.

FROST A great many plants are damaged to a greater or lesser degree, by temperatures below freezing point. In consequence, frost is one of the big problems with which the gardener has to contend. There are three principal ways in which this problem can be tackled (1) by protecting plants, either all the time or when frost threatens; (2) by preventing frost, at any rate at those periods when it is likely to do most damage; (3) by producing varieties which are resistant to frost.

Protection against frost Familiar methods of protection against frost are the greenhouse and the frame (pages 95 and 111). There are, however, other methods which the gardener may employ, particularly with plants which for one reason or another cannot readily be removed to a greenhouse or frame during cold spells of weather. A covering of ashes, peat, chopped bracken, straw or some other material with good heat insulating properties will often serve to protect the crowns of herbaceous plants that are subject to frost damage, e.g. *cremurus* and *gunnera*. Such a protective covering should be placed in position as

soon as the leaves die down in autumn and need not be removed until shoots begin to appear the following spring. It is often desirable to keep such a protective covering out of direct contact with the dormant crown of the plant. This is particularly so with *gunneras* and the method employed is to place some bushy hazel twigs over the plant, or make a low, tent-like structure with fine-meshed, galvanized wire netting and then place the protective material over the twigs or netting. If chopped bracken or straw is used, it is also convenient to have a further outer covering of wire netting pegged down over this material to prevent it being blown away.

Hessian or old sacking is sometimes used as a protective screen for plants, particularly for shrubs such as *hydrangeas*, which are liable to suffer during frosty weather. No attempt should be made to cover the plants completely with such material, as this would exclude too much light and encourage premature or weak growth. The method is to place a screen closely around the specimen to be protected but to leave the top open for ventilation. Such a screen will give a large measure of protection, though it will not save plants from damage if frost is very severe or protracted.

A third method is to employ wattle hurdles as a screen. This is serviceable for large specimens or groups of plants which could not easily be protected by sacking or hessian as just described.

Although most fruit trees grown in this country are perfectly hardy, their blossom is often very susceptible to frost damage and if this occurs, the crop may be much reduced or completely destroyed. Small bushes can be protected from all except the most severe spring frosts by covering them with muslin or tiffany. Old lace curtains can be used for this purpose. Such protective coverings should only be used just before and during the blossom period when frost threatens and in general will only be required at night, being removed each day. Wall-grown fruit trees, such as peaches and nectarines, are often protected while they blossom by hanging hessian or tiffany in front of them. Some measure of protection is provided by a screen of fish netting as

used for protecting raspberries and other soft fruits against birds.

Portable cloches can be used to give frost protection to small plants and seedlings and the use of these is described elsewhere (see page 54).

Prevention of frost It is only practicable to consider the prevention of frost outdoors for short periods during the spring months, but as these are often the most damaging frosts in the garden, especially where fruit is concerned, this is a measure which deserves attention. Spring frosts, and particularly those frosts which occur during the last half of April and throughout May, are generally of the type known to meteorologists as radiation frosts, which may be contrasted with wind or 'convection' frosts. The latter are due to cold streams of air which may be coming from many hundreds of miles away. Very little can be done to check wind frosts, except possibly, the erection of walls or the planting of screening hedges. By contrast, radiation frosts are most liable to occur when the air is still. They are caused by loss of heat from the earth's surface by radiation into outer space and this loss occurs most rapidly when the sky is cloudless. If on an April or May evening the wind gradually dies away and the sky becomes completely clear, the gardener may suspect that a frost will occur by dawn the following morning. His suspicion may become a near certainty if at the same time a wet thermometer placed outdoors gives a higher reading on the wet than on the dry bulb. Usually such frosts are foretold by the meteorological experts and announcements are made beforehand over the wireless. The fruit grower should pay particular attention to such warnings just before and during the blossom period.

There are four methods of preventing damage during periods of radiation frost. As the air is undisturbed it will tend to move very slowly, but none the less surely, according to its own weight, which will be governed by its temperature, cold air weighing more than warm air. In consequence the cold air will flow downhill like a stream of water, filling hollows and valleys and leaving the high ground. This accounts for the fact, which so often puzzles gar-

deners, that exposed gardens on the tops of hills often suffer far less from spring frost than those situated in sheltered valleys. This slow flow of cold air may be impeded by any fairly solid obstacle such as a wall or dense hedge. In consequence walls and hedges erected as a protection against wind frosts may actually serve as a trap for the cold air caused by radiation frosts. This air will pile up above the wall or hedge and may cause severe damage to plants growing on or near it. This suggests the first method of preventing damage by spring frosts, namely, to cut large holes in walls or to remove the bottoms of hedges for a height of a foot or so to allow the cold air to flow through. It will also be realised that it is prudent to plant tender subjects or fruit trees and bushes, the blossom of which is liable to be damaged by frost, on high rather than on low ground. It may be added that it is the relative rather than the absolute height of the ground, that matters. A hollow situated on a high plateau may be a frost pocket, whereas a knoll in lowland country may stand clear of the surrounding frost.

A second method of countering spring frost is to warm the air. Many methods have been tried but none has as yet proved economically successful. In some large fruit orchards kerosene burners are placed at frequent intervals and lit when frost threatens, but the cost of running is high and the method is only reasonably efficient where a fairly considerable area is covered by burners. In small orchards cold air flows in too quickly from outside.

A third method is to stir up the air and to draw down the comparatively warm air which will be found above the cold layer near soil level. Experiments have been made in the use of propellers mounted on towers, to draw a column of air from above into the garden or orchard. A certain degree of success has been obtained, but once again the method is of more interest to the commercial grower than to the private gardener as it is not economical on small areas.

The fourth method is by slowing down the radiation from the earth surface to the sky. This may be done by covering the

whole area with a dense fog or smoke such as that produced from damp bonfires. Such methods are much used on the Continent for protecting vines and may have some value, though experts differ on this matter.

Frost-resistant varieties There are two main lines on which the gardener may work in producing frost-resistant varieties. One is to breed varieties the tissues of which are actually more resistant to frost than older varieties of the same kind of plant. There are obviously limits to which such increase in hardiness can be pushed and too much must not be expected from it. Examples of this kind of variability in resistance may be seen in apples. The blossom of Bramley Seedling is very susceptible to frost damage, whereas that of Lord Lambourne is comparatively resistant.

An alternative line of approach, and one which holds out much hope for the fruit grower, is based on the fact that it is the young growth and blossom of woody plants which is most likely to be damaged. If varieties can be produced which start into growth and produce their blossom later than other varieties of the same kind of plant, they may escape the period in which frost is likely to occur. A notable example of this is to be seen in Apple Crawley Beauty which seldom blossoms until the end of May by which time it is unlikely that any severe frost will occur. Other late flowering apples which are useful for planting in frosty districts are Edward VII, Court Pendu Plat and Royal Jubilee.

FRUIT Literally the seed-bearing organ of a plant. A dry pea pod is as much a fruit in this sense as is a peach. In gardens, however, the term is usually confined to edible fruits which can be used for dessert.

FULL BLOSSOM, see *Bud Stages*.

FUMIGATION A method of destroying pests or disease-causing organisms by exposing them to poisonous fumes. For obvious reasons fumigation is of more use in greenhouses or other closed structures than out of doors, though it can be practised out of doors with special apparatus. For example a method has been devised for fumi-



Fumigating by means of a smoke canister

gating strawberries against aphids. A large drag sheet is pulled slowly across the crop and the poisonous gas, in this case nicotine, is blown underneath this sheet. This method has not yet been applied to small areas though there seems to be no theoretical objection to this. Fumigation of individual plants can also be accomplished by placing them in a box or other container and introducing the necessary gas.

Before fumigating a greenhouse it is necessary to make certain that ventilators and doors can be shut tightly and that there are no broken or missing panes through which fumes might escape. If there are gaps round the edges of doors and ventilators, provision should be made to cover these with wet sacks or some other suitable material. As a rule fumigation must be continued for several hours in order to be effective. During this period the house must be kept closed up and no one must enter it, so it is usually most convenient to fumigate in the evening and leave the house shut up all night.

The chemicals most frequently used for greenhouse fumigation are nicotine, tetrachlorethane, calcium cyanide, BHC, sulphur and naphthalene. Nicotine is used mainly for greenfly; tetrachlorethane for white fly; calcium cyanide for white fly, greenfly, thrips and scale insects; sulphur for red spider and naphthalene for thrips.

Another purpose for which fumigation can sometimes be used very effectively is to clear soil of pests. In this instance some substance which gives off fumes such as naphthalene, paradichlorobenzene or carbon disulphide is either injected into the soil by means of a special 'gun' or placed in holes bored in the soil at frequent intervals, the holes then being sealed with soil to prevent the escape of fumes.

Nicotine fumigation There are two methods of fumigating with nicotine, either to vaporize liquid nicotine over a spirit lamp or to burn paper or other material which has been suitably impregnated with nicotine. Specially prepared nicotine for liquid vaporization can be purchased ready for use or, if preferred, it can be prepared at home by mixing 'pure' nicotine with an equal quantity of methylated spirit; $\frac{1}{2}$ fluid ounce of this mixture is sufficient to fumigate 1,000 cubic feet of space. Proprietary nicotine should be used in accordance with manufacturer's instructions as individual brands will differ in strength. Various proprietary shreds and cones can be purchased to be burned in the house, and again manufacturer's instructions regarding strength must be followed. As a rule 1 ounce of shreds is sufficient for 1,000 cubic feet but there is no fixed strength.

Special lamps can be purchased for vaporizing the liquid nicotine, or a copper saucer may be placed over an ordinary methylated spirit lamp. In any case, the lamp should be placed as nearly as possible in the middle of the house or, if it is a large house, several lamps should be used at regular intervals to secure even distribution of fumes. In the same way, shreds or cones should be placed in the centre of small houses or several piles of shreds or separate cones should be used at intervals in larger houses. At all times it is desirable to keep the vaporizing liquid or burning shreds or cones well away from plants in small houses. In small or crowded houses it may be necessary to clear a few of the plants from the stages immediately round the fumigating lamp or burning material.

Directly the lamp, shreds or cones are ignited the house should be vacated and closely shut. Take care to see that no

animals are left inside or they may be poisoned by the fumes. After 12 hours, open the door of the house and the ventilators so that any remaining fumes are driven out. Then in a short time it will be safe to work in the house in a normal manner. It is usually desirable to repeat fumigation after a week or 10 days to ensure a complete clearance of greenfly.

Fumigating with Tetrachlorethane

This is a fluid which vaporizes readily when exposed to the air. The usual rate of application is $2\frac{1}{2}$ to 5 fluid ounces per 1,000 cubic feet, but when using proprietary brands manufacturer's instructions should be consulted. It is only necessary to sprinkle the specified quantity on the floor of the house, starting at the far end from the door and working back to the door. The house should then be left and closed and the same precautions taken as advised for nicotine. This also applies to the opening of the house the following morning. It is desirable that the atmosphere of the house to be fumigated should be a little on the dry side and that the temperature should be slightly above the average—say about 65 degrees. A second application should be given after a fortnight.

Tetrachlorethane is harmful to some plants and should not be used on *Asparagus Sprengeri*, azaleas, balsams, begonias, chrysanthemums, cinerarias, calceolarias, camellias, cannas, crassulas, dahlias, fuchsias, hydrangeas, lemon verbenas, pelargoniums and salvias.

Fumigation with calcium cyanide

This is purchased as a fine white powder. When exposed to moisture it reacts to produce hydrocyanic acid gas. The atmosphere in an ordinary greenhouse is sufficiently damp to produce this reaction. As hydrocyanic acid gas is extremely poisonous, calcium cyanide is a substance which must be used with rather more than usual care. The standard dose is $\frac{1}{4}$ ounce per 1,000 cubic feet, but for a few plants such as ferns, asparagus ferns, chrysanthemums, very young tomatoes, heliotrope, sweet peas, schizanthus and most small seedlings, the dose should be reduced to $\frac{1}{8}$ ounce per 1,000 cubic feet.

As with tetrachlorethane, the atmos-

phere of the house should be allowed to become a little drier than usual and the temperature to rise slightly above the normal, say to 65 degrees. The specified quantity of calcium cyanide is then sprinkled on the house path, starting at the far end from the door and working back to the door. The house is immediately closed and sealed for a minimum of 12 hours. The same precautions should be taken regarding opening as advised for nicotine. The fumigation should be repeated 12 days later.

Fumigation with sulphur There are two methods of fumigating with sulphur: one is to burn sulphur in the house and the other is to vaporize it over a special lamp. The first is extremely effective in killing red spider, but it is also fatal to all plants and therefore can only be used in houses that have been emptied of plants. Where this is possible, it is a useful and simple method of ensuring that no red spiders remain on the woodwork or elsewhere. A strength of 3 pounds per 1000 cubic feet is suitable. Vaporization from a special lamp requires care, as if by accident the sulphur should ignite, fumes poisonous to plants will be produced. However, properly handled, sulphur vaporization can be carried out in a stocked greenhouse without injuring the plants.

Fumigation with naphthalene Grade 16 naphthalene is used for this purpose and is volatilized from a special lamp. The standard rate of application is 4 to 6 ounces of grade 16 naphthalene per 1,000 cubic feet of space. The same general instructions should be followed as for nicotine fumigation. The remedy is particularly effective for thrips on carnations,

Soil fumigation Carbon disulphide is an inflammable liquid which gives off a gas with an unpleasant smell. It is used mainly to destroy chafer larvae in the soil and also the aphides and mealy bugs which live on the roots of plants. The method is to inject the fluid into the soil with a special injection gun or pour it into dibber holes at the rate of 5 fluid ounces per square yard in the open ground. Potting soil can be fumigated by placing it in a heap, boring holes into it and pouring in carbon disulphide at the rate of 2 fluid ounces per cubic foot.

Naphthalene is used for wire worms, leather jackets, millepedes, etc. The type known as flake naphthalene is employed. This is crystalline and is applied at the rate of 4 to 8 ounces per square yard, the smaller quantity on light and the larger quantity on heavy soils. The method of application is to spread the naphthalene on the surface and then lightly work it in.

Paradichlorobenzene is used in much the same way and for the same purpose as naphthalene but only about $\frac{1}{2}$ ounce is required per square yard. It is purchased in the form of rather large crystals which must be ground or pounded to a fine powder before use.

FUNGICIDE Any substance which will kill fungi. As a great many plant diseases are caused by fungi, fungicides are of great importance to the gardener. The ideal substance is one which, while very poisonous to fungi, is completely harmless to garden plants. This may never be fully attained but several chemicals or combinations of chemicals come sufficiently close to it to have a wide application in the garden. One of the most useful general fungicides is Bordeaux mixture which is composed of copper sulphate and quicklime. Copper sulphate itself is very poisonous to fungi, but unfortunately it is also damaging to foliage and soft shoots and can only be used on deciduous plants in the winter months, and then only with great care. Sulphur is another excellent fungicide and is often used by itself in finely powdered form, either as flowers of sulphur or as green horticultural sulphur which is really flowers plus colouring matter to make it less conspicuous on plants. Lime and sulphur are combined in the fungicide known as lime-sulphur. This must be purchased as a concentrated solution which is then diluted with water according to manufacturer's instructions. Other popular fungicides are liver of sulphur, Burgundy mixture and ammonium polysulphide. All these substances are described more fully under their respective names.

FUNGUS One of the important divisions of the vegetable kingdom. Fungi are of

many different kinds and differ greatly in appearance, habit and method of growth. All are alike, however, in lacking green colouring matter and therefore being unable to manufacture their food from simple chemicals, using for the process energy derived from the sun. In consequence they must obtain food supplies ready made and this many of them do by attaching themselves to living plants which possess the green colouring matter necessary for photosynthesis. They are, in fact, parasites and like most parasites they can live only by weakening or, in some cases, actually killing their hosts. It is for this reason that many fungi are correctly regarded by the gardener as enemies, for they are the cause of many plant diseases.

It must not be thought, however, that all fungi are similarly harmful. Many are not parasites but saprophytes, i.e. they live on plant tissue or other organic matter which is already dead. Frequently these saprophytic fungi perform a very useful function in promoting the decay of this dead material and hastening the liberation of the chemical plant foods which it contains and also the production of the humus which is so valuable in the maintenance of soil texture. There are even some fungi which are valuable as human food. The most familiar is the mushroom which has become an important garden crop.

The most spectacular part of many fungi is the reproductive or spore-producing organ and it is frequently mistaken by the uninstructed for the fungus itself. In fact it is no more the fungus than the flower of a flowering plant is the plant. The main body of the fungus is composed of a multitude of thread-like growths collectively known as mycelium. If a mushroom bed in full crop is opened, it will be found that the bed is filled with this mycelium so that most of the compost has a whitish appearance. When a parasitic fungus, such as that which causes Black Spot in roses, attacks a plant, this thread-like mycelium penetrates the living tissues far and wide, drawing nourishment from the growing cells and destroying them in the process. It is for this reason that the area destroyed gradually increases in extent as the mycelium penetrates further

and further into the plant in search of more living tissue from which to draw its nourishment.

Another feature which all fungi have in common is that they reproduce themselves by spores. These are often compared to the seeds of flowering plants, though in fact they differ in many vital features. However, they have this in common with seeds, that they are produced in great numbers, are carried far and wide and, that when they find suitable conditions, they germinate and give rise to new specimens of their own kind. Spores are so extremely small as to be dust-like. In consequence they can be carried considerable distances by wind or may be spread in water or on the feet of animals, birds etc. Many fungi produce a special type of spore in the autumn, which is capable of resisting cold and other adverse conditions, remaining dormant for a long period and so ensuring the survival of the species during the winter months.

GALL An abnormal outgrowth which may be due to a variety of causes. Many galls are produced by insects, one of the most familiar being the gall often found on the base of the stem of cabbage and other brassica seedlings, these being due to the maggots of the cabbage gall weevil. Oak trees seem to be particularly susceptible to galls of one kind and another, all of which are caused by the irritation set up by minute insects feeding in the tissues. The curious marble-like structures known as oak apples are galls. Roses suffer from a curious and rather beautiful gall often known as a bedeguar or 'Robin's pincushion'. This may be the size of a Spanish Chestnut complete with its outer husk. It is covered all over with hair-like growths, some of which may be green and others red.

However, it would be a mistake to assume that all galls are caused by insects. One of the most spectacular is the crown gall caused by a bacterium. It grows on a great many different kinds of plants and particularly on fruit trees found on or near soil level. Crown galls often attain considerable size—maybe as big as a football. They seem to have little or no effect on the

vigour and health of the plant which they attack.

In general, galls are extremely difficult to control as the pests or other organisms which cause them are more or less completely protected by the gall itself. Fortunately, galls seldom do much damage and are to be considered more as curiosities than as actual pests or diseases.

GALL WEEVIL This small white grub which attacks the base of the stems of cabbages and other brassicas causing them to develop lumps or galls, is described more fully under the name cabbage gall weevil.

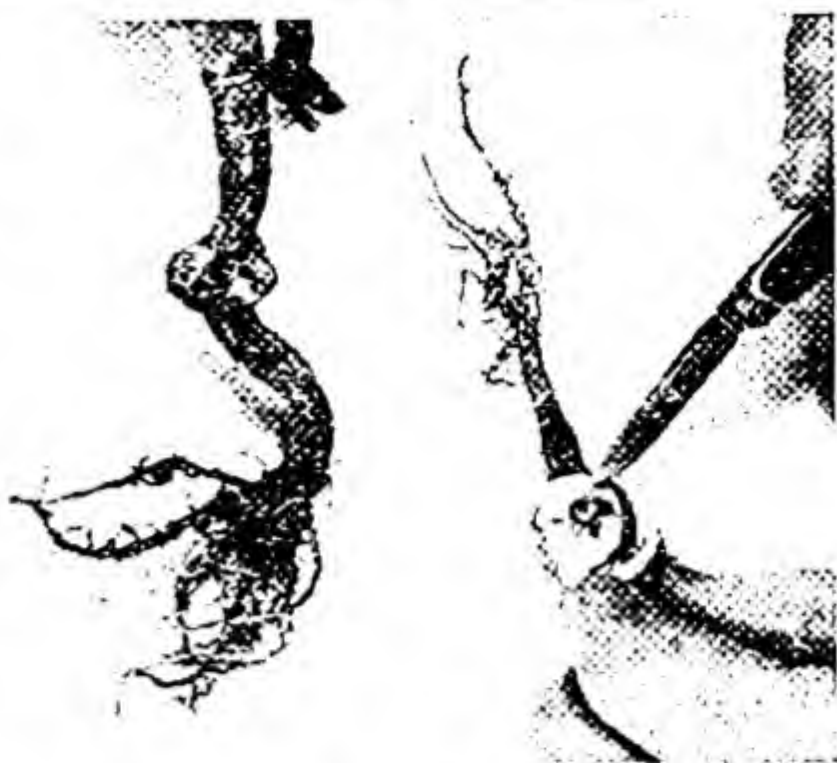
GAMMA-BHC, see *BHC*.

GAMMEXANE A proprietary name for a particular brand of BHC. (*q.v.*).

GENE The physical unit of inheritance. The development of every characteristic feature in a plant or animal is controlled by a gene or genes. It will be realized, therefore, that even a fairly simple organism will have a great many genes, yet so small is each that the complete set characteristic of that organism is reproduced in every living cell. Individual genes are collected together into rod-like bodies known as chromosomes which themselves form a part of the nucleus of each living cell.

In the body cells genes commonly occur in pairs which separate when sex cells are formed so that these special cells only contain one of each pair of genes. The pairs may be identical or dissimilar. In a very simple example, such as the pair of genes which control flower colour in the four o'clock flower (*Mirabilis Jalapa*), the petals may be red, white or pink depending on whether both genes are of the type which produces colour, both of the type which inhibits colour or one of each type.

It is not usually as simple as that. Commonly one variant of each pair is dominant over the other so that when both are present the effect of one is completely masked. A familiar example of this is the round-seeded or wrinkled-seeded feature in peas. These characters are controlled by a pair of genes. If both are for the round-



Gall weevil damage on a cabbage stem

seeded character all seeds will be of this kind. If both are for the wrinkled-seeded character all seeds will be wrinkled. But if a plant carries opposite genes the seeds are not intermediate, but are all of the round-seeded type. The importance of this will appear when such 'hybrid' peas are used as parents, for the genes never lose their identity even when masked in this way, and if, in the re-formation of pairs which occurs with each generation, genes for the wrinkled character again come together, that character will re-appear.

Plants which carry many genes of opposite characters, such as the round- or wrinkled-seeded factor in peas are described as heterozygous and are said to be hybrid-breeding, whereas those in which all or nearly all the genes are of identical pairing kind are said to be homozygous, or pure breeding. One of the problems confronting the seedsman who wishes to place a seed novelty on the market is to ensure that all, or nearly all, heterozygous plants are eliminated, and that, in consequence, this novelty will breed true from seed. Many plants, including most fruit trees, cannot be raised true to type from seeds because of the number of contrasting genes which they contain.

GENETICS The science of heredity which includes that of breeding.

GENUS A group of closely related species (see *Classification*).

GERMINATION The first stage in the growth of a seed. In order to ensure germination, the seed must not only be living, but must also be provided with certain physical conditions, including a reasonable quantity of moisture, a sufficiently high temperature and some air. The precise degree of temperature required for germination varies from one species to another, and almost invariably plants from tropical regions require a higher temperature than those from temperate regions. These temperatures may vary from as little as 45 degrees for plants from cold regions to as much as 75 or even 80 degrees for tropical plants.

Many seeds lose their power of germination fairly quickly, and with all seeds the power of germination tends to be lowered with the passage of time. Stories concerning the germination of seeds after many thousands of years can be dismissed as false, but it is quite possible for some seeds to germinate after periods of 10, 20, 50, or possibly even 100 years. Nevertheless, it has been estimated that delphinium seeds lose at least 50 per cent, of their germinating power within the first 6 or 8 months. The majority of seeds appear to germinate most readily and satisfactorily when the soil in which they have been sown is exposed to a fair amount of light, but a few seeds will only germinate in the dark. Air is essential to germination, and it is often through lack of air that seeds buried too deeply fail to germinate or germinate badly. Many seeds go through a period of dormancy after ripening during which they cannot be germinated no matter what the conditions. Others will germinate the moment they are ripe or even before they are fully ripe. An example of this may be seen in wet seasons in cornfields in which ears of corn often commence to sprout while they are still standing in the sheaves and before they are fully dried off. The provision of a good tilth for seed beds or of a suitable compost for seed pans and boxes is very important because this kind of tilth or compost provides the physical conditions of moisture and air which are essential to germination. If the tilth is faulty or the compost too fine, the soil will pack down so closely over the seeds

that air will be excluded and germination prevented or retarded. If the soil is too loose it will dry out so quickly that there may not be sufficient moisture to complete germination.

GISHURST COMPOUND A proprietary preparation containing soap and sulphur and used in the greenhouse to kill mealy bugs. It is applied to the dormant rods of vines and similar hard-wooded plants with a rather stiff, wet paintbrush. Gishurst compound should only be used in winter when growth is dormant.

GLABROUS Strictly speaking this term means no more than 'not hairy' though it is frequently wrongly used in the more positive sense of 'smooth'.

GLASS In the garden glass is used principally in the construction of greenhouses, frames and cloches. For all these purposes it is important that it should be reasonably free of bubbles which may act as lenses and so focus beams of sunlight on to plants in the manner of a burning glass, possibly causing serious damage. It is also important that glass should be reasonably thick, partly because thin glass is very liable to be broken, but even more because the heat insulation properties of glass depend a good deal on its thickness. Contrary to popular belief, glass is a fairly good insulator when compared, thickness for thickness with other materials such as wood or brick. The thickness of glass is always indicated by the weight of a sheet measuring one square foot. Thus 21-ounce glass, which is the usual weight for horticultural work, weighs 21 ounces per square foot. Sometimes 24-ounce glass is employed and this gives superior protection.

It is not essential that glass for horticultural use should be completely clear, though it must not be very opaque. However, the type of glass usually referred to as rolled glass can be used and is cheaper than clear glass.

Ordinary glass, though transparent to all visible light, does not allow the ultra-violet rays to pass through. Special glass can be manufactured which is translucent

to these rays and it has sometimes been claimed that this has special value for horticultural purposes, but experiments have not substantiated this.

GLASSHOUSE, see *Greenhouse*.

GLAUCOUS Bluish grey; covered with a 'bloom'. A term often used in the description of leaves or stems.

GOOSEBERRY MILDEW Two quite distinct fungi cause mildew diseases on gooseberries. One is known as American gooseberry mildew, and the other as European gooseberry mildew, and the former is by far the more serious. They can be distinguished by the fact that the American gooseberry mildew produces a greyish or brownish, felt-like outgrowth on the fruits and leaves, particularly on the tips of the young shoots. As a result growth is crippled. Though the fruits can be washed clean and are then quite palatable, much time is wasted and the crop is seriously damaged from a commercial point of view. European gooseberry mildew produces a powdery white outgrowth on the leaves and does not affect the fruits.

Both these mildews can be kept in check by spraying with lime sulphur or washing soda and soft soap. One application of lime sulphur at summer strength applied as soon as the fruits have set, is usually sufficient to

control European gooseberry mildew, but two applications are likely to be required for American gooseberry mildew, the first when the fruits are set and the second three weeks later. If washing soda and soft soap are used, 5 to 6 applications should be given at intervals of two or three weeks, from the time the fruits are set until they are nearly ripe. The washing-soda treatment has the merit that the fruits are not marked in any way.

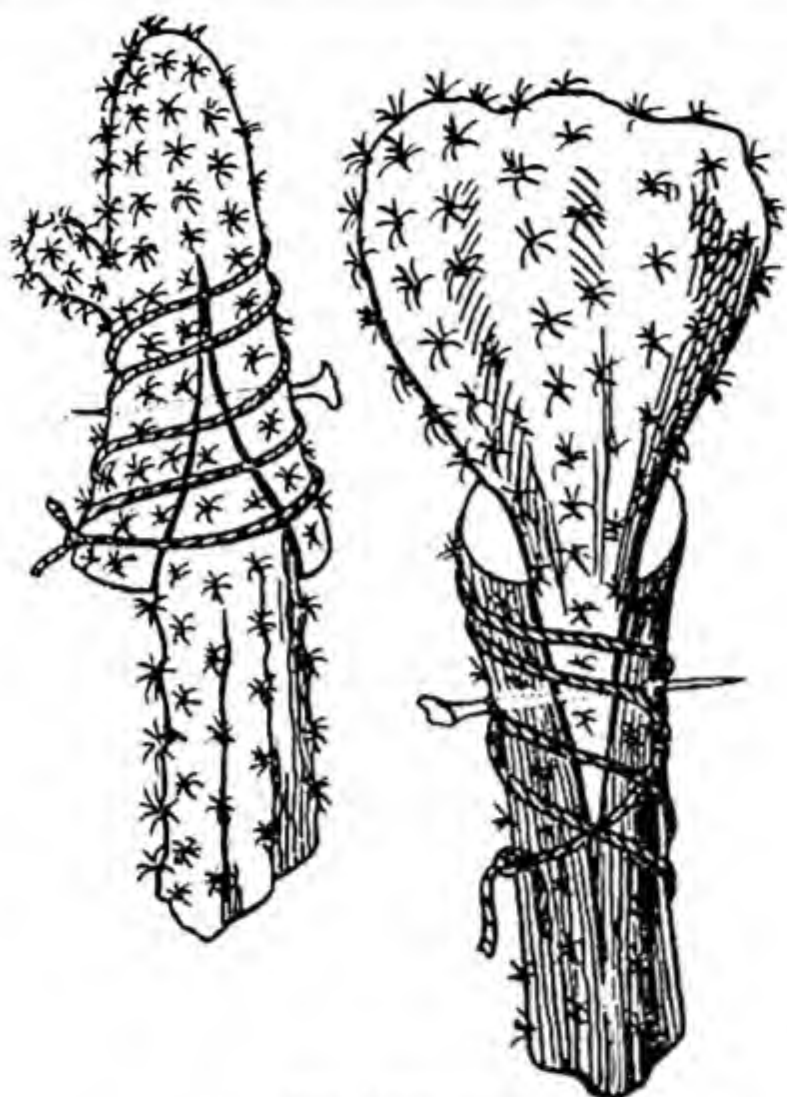
GRAFT HYBRID A hybrid which has resulted from the intermingling of the cells of stock and scion after grafting. See *Chimæra*.

GRAFTING Graft is the name applied to any union made between one plant and another or even between two branches of the same tree or shrub and it may occur naturally, as when two branches in a hawthorn hedge rub together and eventually wound each other sufficiently to produce calluses which then fuse into one. This is really the essential feature upon which grafting relies—the ability of a wounded surface of living plant tissue to produce a callus of new growth to cover the wound. If two artificially wounded surfaces are bound together and the right conditions are provided, they will unite through their respective calluses, provided the plants themselves are sufficiently closely related. The gardener makes use of this characteristic to propagate many plants which would otherwise be difficult because they do not root readily from cuttings or cannot be raised true from seed. Budding, which is really a form of grafting, has already been described (see page 33).

There are a good many different ways of grafting, all of which rely on the same principle but which differ in the details of their application. Some have been found in practice to be more suitable for certain kinds of plant than others and also some, by their nature, are more suitable for joining parts of plants which differ greatly in their diameter, e.g. the thin shoot of an apple to the thick trunk of an old apple tree, whereas, by contrast, other methods are more valuable where the parts to be joined are roughly of the same diameter,



Gooseberry mildew



Grafting cacti

e.g. where a young apple shoot is to be joined to a young apple stock.

Before describing the most important of these methods, it is necessary to explain two terms which are used in connection with every kind of grafting. They are 'stock' which is the name given to that member of the union which is to provide the roots, and 'scion' which is applied to that member of union which is to supply the branches or top growth.

Grafting is usually done just as the plants are starting into growth; for example the grafting of apple and pear trees is done at the end of March or early in April. It is desirable that the stock should be a little more advanced in growth than the scion, and to ensure this suitable young shoots from which scions may be prepared are usually cut in December or January and planted, right way up, in soil, in the coolest and shadiest place possible, such as the north side of a wall. Here they will keep plump and in good condition but perfectly dormant for several weeks after shoots on the tree have broken into leaf. It should be understood, however, that though this use of retarded scions helps grafting, it is not essential to it.

If the grafting is successful, the scions will usually start to make leaves and new shoots within a few weeks. A month or so after this, the wax and tie should be very carefully removed to prevent the latter from cutting into the swollen bark. When this has been done make quite certain that the scion has made a firm union with the stock by the formation of new callus growth. If there is any doubt on this point, do not disturb the scion but retie at once. It should not be necessary to rewax.

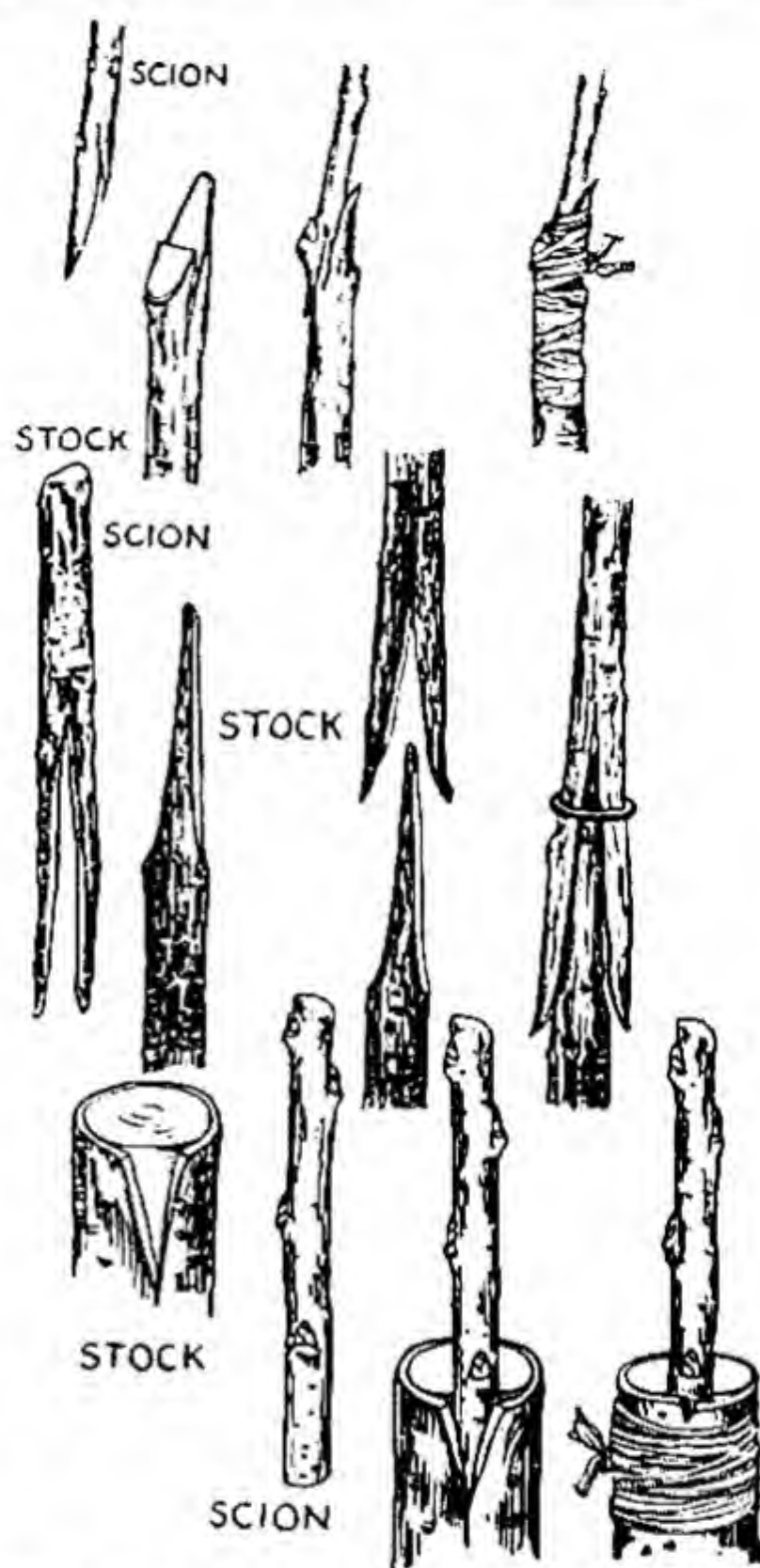
Bridge grafting This, unlike other methods of grafting, is not used as a method of propagation but as a means of repairing. It is particularly serviceable where trees have been badly barked by rabbits or other animals or cankered. If the bark has been removed right round the trunk of the tree, so as to destroy a complete ring of cambium, the plant is almost certain to die in time as there will be no connection for the return of food from leaves to roots. To overcome this the gardener can bridge the gap with a series of grafts prepared from young shoots of the same or a similar tree. The method of preparing the grafts in this case is very much the same as for rind grafting, except that the 'scions' must be long enough to bridge the gap with a little to spare and must be cut to a tapering wedge at each end. Similarly two vertical incisions are made in the bark of the damaged tree, one above and one below the point of barking. One prepared wedge of the bridge is then inserted in the lower incision and the other in the upper incision and both are bound in place and waxed. As a rule it is necessary to insert several of these bridges round the trunk where it has been barked. The bridges, as their name implies, carry sap over the wounded area. In time they will increase in girth and serve to support the tree and maintain it in healthy growth for many years.

Cleft grafting This is an old-fashioned method used mainly for the reworking of old fruit trees. It is not a particularly good method as it necessitates splitting the top of the stock and water is apt to collect in this split and cause decay. It has, however, the merit of simplicity. The stock is beheaded

as for whip and tongue or rind grafting (see below), and is then split down the middle with a chopper or billhook which can be driven in with a hammer. The scions, which are made from year-old shoots, are cut at the base in the form of a long tapering wedge, two cuts being made on each scion, one on each side. There are thus two exposed surfaces instead of one as with whip and tongue and rind grafting. The taper wedge is then inserted in the cleft in such a manner that the cambium layer on one side coincides with the cambium layer on the other side of the stock. As a rule a wooden or metal wedge is used to keep the cleft open while the scion is being inserted and then the wedge is removed so that the cleft closes together and grips the scion in position. It is common practice to insert two scions in each cleft, one at each side. After this the scions are bound in position and the wound covered with grafting wax.

This form of grafting is sometimes used in the propagation of double-flowered forms of the perennial gypsophila (*Gypsophila paniculata flore pleno*). In this instance roots of the ordinary single-flowered strain are used as stocks. Pieces of roots about $\frac{1}{2}$ inch in thickness are cut up into lengths of from 2 to 3 inches. The top end of each piece of root is then split downwards for a length of about one inch. The scion is prepared from a firm young shoot of the double gypsophila and the bottom of this shoot is cut on both sides to form a narrow wedge. It is then inserted in the split rootstock in the ordinary way and bound up but no wax is applied. The grafted plant is then potted in a sandy compost, the whole of the wounded area being covered by this. The pots containing the grafts are finally plunged in a warm propagating frame. This kind of propagation is usually done in late spring or early summer.

Framework grafting This name is applied to a system of reworking old fruit trees in which, instead of the main branches being cut back to short stumps, practically the whole of the original branch system of the trees is retained and a great many grafts are inserted on this extensive framework. The method is laborious and requires a lot of grafting material, but has



Grafting Above: whip and tongue grafting; centre: saddle grafting; below: rind grafting

the advantage that a full-sized cropping tree can be obtained in a year or so, whereas, if the main branches are cut away, several years must elapse before a new branch system is elaborated. Frameworking is sometimes known as porcupine grafting, because of the quill-like appearance of the grafts studded all over the tree.

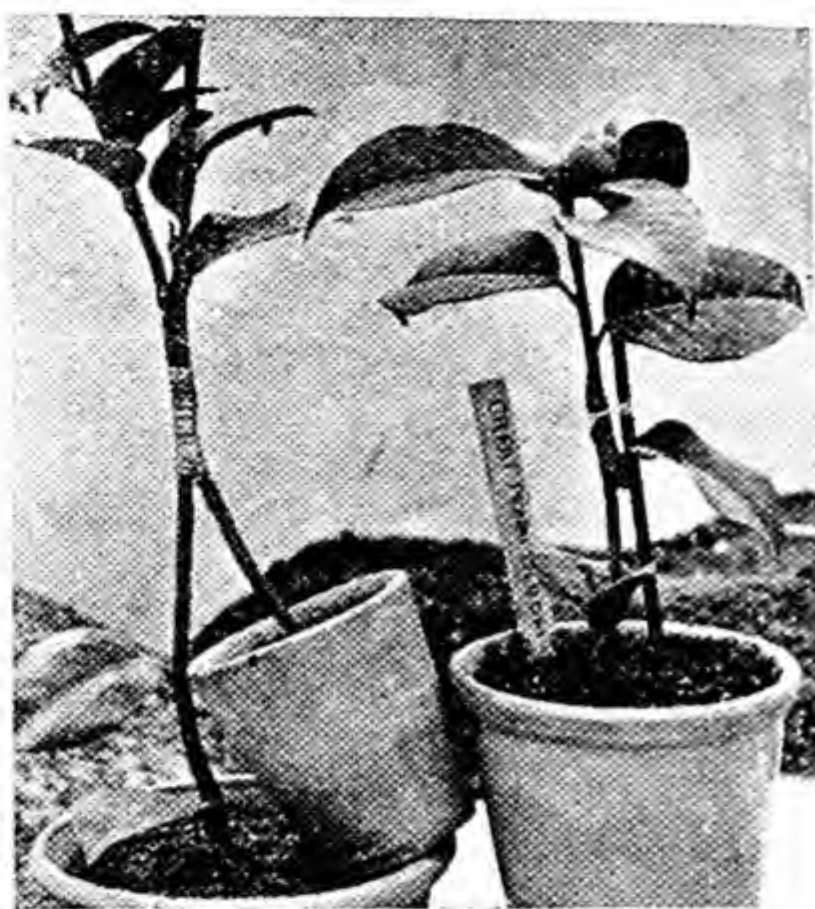
Four methods of grafting are commonly used when renewing trees by the framework method, whip and tongue grafting, stub grafting, oblique side grafting, and bark or inverted grafting.

Stub grafts are inserted in the bases of side-growths, usually growths not above

$\frac{1}{2}$ inch in thickness. The side-growth is prepared to receive the graft by making a short downward cut on its upper surface. The scion is prepared from part of a well-grown, year-old shoot cut at the bottom to form a rather short, double-sided wedge. The side-growth is then bent downwards so that the incision in it opens. The wedge of the scion is thrust into this and the shoot is then released so as to spring back and grip the scion in position. No tying is necessary. The shoot is severed at once just above the graft and the whole wound is then covered with wax.

Oblique side grafting is done directly on to main branches and stems too thick for stub grafting. A rather shallow downward incision is made in the bark of the branch or stem. The scion is made from similar material to that used for stub grafting and is cut in the form of a tapering wedge, the two faces of which are inclined towards one another so that where they meet they form a knife-like edge. This wedge is then thrust obliquely into the incision in the bark in such a way that one face lies snugly against the exposed wood of the branch and the other against the interior face of the flap produced by the incision. The springiness of the flap of bark is usually sufficient to grip the scion in position, but if it does appear to be at all insecure, it can be further fixed with a gimp pin. The wounded area should then be covered with grafting wax.

Bark or inverted-L grafting is also a method by which scions may be inserted directly on the main branches or stems. First of all an incision is made in the bark of the stem in the form of a rather obtuse-angled L. The flap of bark formed by this incision is then gently raised from the wood beneath with the thin, scalpel-like end of a budding knife. The scion is made from similar material to that used for the other grafts, and is prepared by cutting it in the form of a wedge at the base, one side of the wedge being considerably longer than the other. It is inserted beneath the flap of bark in such a manner that the longer surface of the wedge lies against the exposed wood of the tree, while the shorter surface is in contact with the interior layer of the flap of



Inarching

bark, and it is fixed in this position with a gimp pin driven right through the bark and scion, into the wood beneath. Once again the whole wounded surface must be protected with grafting wax.

Inarching This method of grafting is sometimes known as grafting by approach—a term which describes it very well. It is used to graft plants without actually severing the scion from its own roots until the union has been made with the stock. It is usual, though not always essential, to have both the plant that is to provide the stock and that which is to provide the scion, growing in pots. The two pots are then placed side by side, a slip of bark and wood about 2 inches long is removed from one side of the stock and a similar slip of bark and wood is removed from one of the more pliable stems of the scion-bearing plant. The two cut surfaces are then fitted together as neatly as possible and bound in this position with raffia or twine after which the whole wounded surface is covered with grafting wax. After a month or so the two cut surfaces should have made a proper union and then the grafted shoot can be severed from the scion-bearing plant just below the point of union.

Rind grafting This is the method most commonly employed in regrafting old trees. It can also be applied to younger material

if there is a fair difference in diameter between stock and scion. The stock is beheaded as for whip and tongue grafting. In the case of old trees that are being reworked, this beheading is usually carried out 7 or 8 feet above ground level. Often the stumps of all the main branches are retained and grafts placed on each stump.

The stock is prepared by making a 2-inch incision vertically in the bark, starting from the point of beheading. The knife should penetrate right through the bark to the hard wood beneath. If the stock is in correct condition, it should then be possible to lift the bark away from the wood on each side of this cut. The scion, which is prepared from a well-grown, year-old shoot as for whip and tongue grafting, is prepared by making a 2-inch-long, wedge-like cut on its lower part. The point of this thin wedge is then inserted beneath the flaps of bark and pressed down until the whole cut surface of the scion lies against the wood of the stock. It is then bound in position with raffia or soft string and covered with grafting wax. If the stock is very thick it is quite possible to insert several scions round it, but they should be placed at least 3 inches apart. Further treatment is exactly the same as for whip grafting.

Saddle grafting This is a system of grafting often employed in the propagation of rhododendrons and some other choice shrubs. Stock and scion should be as nearly as possible of the same diameter. As a rule this kind of grafting is done in a propagating frame within the greenhouse, for which purpose young stocks are potted some months in advance. However, there is nothing in the method itself which makes this treatment essential, but simply that it is usually applied to subjects which require more nursing than fruit trees.

The stock is prepared by being beheaded a few inches above ground level and then cut on both sides to form an upward-pointing wedge. The scion is split upwards from the base so that it can be fitted like a saddle over this wedge. It is essential that the cambium layer of the scion shall touch that of the stock on at least one side. If stock and scion are of equal diameter, it

will be possible for them to touch on both sides, which is ideal. In either eventuality, when in position, the scion is bound to the stock with raffia or soft twine.

Splice grafting This is the simplest method of grafting as far as the actual preparation of the cuts is concerned. A simple



Splice grafting

oblique cut is made on both the base of the scion and the top of the stock, the two cuts to be as nearly as possible of the same length and width. The two cut surfaces are then placed in contact and bound together after which the wounded surface is covered with grafting wax. It will be seen that the method very closely resembles whip and tongue grafting without the 'tongue' which so conveniently holds the scion in position while it is being bound to the stock.

Whip and tongue grafting This is probably the most widely used method of grafting where young stocks are concerned. It is the method employed by most nurserymen for propagating apples and pears and it is also used for many ornamental trees. It is not a good method to use where there is a great difference in diameter between stock and scion, though it can be used when the stock is as much as twice the diameter of the scion.

The essential wounding in this method is done by removing, with a sharp knife, a long slip of wood from both stock and scion. The stock is usually a young seedling or

well-rooted cutting and it should be well established in the soil. First of all this stock is prepared by being beheaded. When using young fruit stocks, this is generally done at a height of 9 to 10 inches above ground level. Any side shoots which may remain on the stock are then removed. The main cut is made by inserting the blade of the knife about 2 inches below the point of beheading and drawing it upwards so as to remove a slip of bark and wood 2 inches long and $\frac{1}{4}$ to $\frac{1}{2}$ inch wide. The scion generally consists of part of a well-grown one-year-old shoot. As a rule a piece 4 to 5 inches long is adequate. The knife is inserted 2 inches from the bottom of this shoot and drawn downwards so as to remove another slip of bark and wood 2 inches long and if possible also $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, so that the cut surfaces of both stock and scion may be fitted exactly together. If the shoot is too thin to permit of a cut of this width being made, the two cut surfaces must be ranged together on one side only. It is essential that the layer of growing tissue, which is known as the cambium layer, be ranged on at least one side; that is to say, the cambium of the stock must actually touch the cambium of the scion on one side if not on both sides of the cut surfaces. The reason for this is that the healing tissue or callus is made from this cambium layer and, as already explained, it is this healing tissue which must knit together to join stock to scion.

To complete the whip and tongue graft, two further incisions are made on the cuts already formed but in an opposite direction so as to form two tongues of wood which can be fitted together. The sole purpose of these tongues is to hold the scion in position on the stock while the gardener binds them together with soft twine or raffia. It is quite possible to make a satisfactory graft without these tongues, provided the two cut surfaces can be held firmly and correctly together while they are being bound. When the binding has been finished the wound must be covered with grafting wax to prevent the rapid loss of sap by evaporation. This completes the operation.

GREASE BANDING This is a device

closely allied to the domestic fly paper, its purpose being to trap insects which ascend or descend the trunks of trees. It is mainly used by fruit growers to protect apple trees from the winter moth, the reason being that the female winter moths are wingless and, after emerging from pupae in the soil, must crawl up the trunks of apple trees in order to lay their eggs on the shoots.

Usually the band is formed by tying a strip of greaseproof paper about 4 inches wide, right round the tree about 3 feet above ground level and smearing this with a very tacky substance specially manufactured for the purpose. The paper band is to keep the 'grease' out of contact with the bark of the tree which it might otherwise damage. In point of fact most modern brands of 'grease' contain no substance harmful to the bark of trees and can be applied direct to the bark with safety. Nevertheless there is still something to be said in favour of using the paper bands which can be readily removed when no longer required and thrown on the garden bonfire.

It is essential to have the bands in position before the female winter moth begins to emerge from their summer period of pupation and ascend the trees to commence their egg laying, and there is not much point in retaining the bands once the egg-laying period is ended. This means that it is desirable to fix the bands by the middle of September and to retain them until



Grease banding

about the middle of March. It may be necessary to add to the covering of 'grease' from time to time as it loses its stickiness with prolonged exposure to air and rain.

In the case of bush trees which have no main trunk 3 feet or more in height, efficient protection may be given by placing one band round each main branch at least 3 feet from ground level. The reason for this insistence on a minimum distance of 3 feet from the ground is that the female moths can be carried for short distances by the winged males and therefore may surmount bands which are too close to the soil.

GREENBACK A common disorder of greenhouse-grown tomatoes which prevents the fruits from ripening evenly and causes them to remain green around the stem or, at most, turn yellowish. Greenback is not caused by any foreign organism such as a fungus or bacterium, but appears to be due to the effect of strong sunlight on the exposed part of the fruit. It is most likely to occur on soils that are deficient in potash and so one precaution is to provide an adequate supply of potash. This may be given in the form of sulphate of potash, both in the preparation of the bed and in top dressings while plants are in growth. Some shading of the glass on the sunny side of the greenhouse will help to prevent this disorder from occurring. It is also undesirable to defoliate plants heavily early in the summer and particularly to remove leaves that are shading trusses of fruit.

GREEN BUD—GREEN CLUSTER, see *Bud Stages*.

GREENHOUSE Any structure mainly of glass or glass substitute large enough to be entered by the gardener and intended for the cultivation of plants. The purpose of the greenhouse is to make it possible to grow plants which are too tender to be cultivated in the open air; to encourage plants to make their growth at an earlier date than they would otherwise do, and to provide congenial conditions for the raising of seeds, the striking of cuttings etc. As regards the first of these objects, it is

important to realise that in prolonged cold spells the temperature within an unheated greenhouse, will tend to fall very nearly as much as that outside. In consequence an unheated greenhouse does not provide adequate protection for really tender plants except in the mildest parts of the country or in exceptionally mild winters. In other places and in normal weather some form of artificial heating is essential if tender plants are to be grown in winter.

Greenhouses are of many different types. They may be classified according to the method of construction of the roof which is termed a span roof when both sides slope either to ground level or to approximately the same height above ground level; three quarter or hip-span, when the roof on one side comes much nearer to ground level than that on the other; and lean-to when the roof slopes in one direction only, the reverse side of the house being formed by a vertical wall.

Greenhouses may also be classified according to their function. Thus there are forcing houses, usually comparatively narrow and low and designed to permit a fairly high temperature to be maintained with the utmost economy in fuel consumption; plant houses, which are usually more lofty and airy and designed to admit the maximum amount of light; propagating houses, often with propagating frames built inside them and intended mainly for the increase of plants by cuttings, grafts, seeds, etc.; vineries, usually tall and airy structures, often built against a south-facing wall and intended primarily for the cultivation of vines; and conservatories, usually attached to a dwelling house and intended primarily for the display of plants which have been reared in more utilitarian structures in other parts of the garden.

The so-called 'aeroplane house' is used mainly for commercial purposes and consists of a number of successive spans carried on light steel or wood uprights, thus allowing a large area of ground to be covered with glass with minimum interference to cultivation and maximum transmission of light.

The Dutch light house is constructed of the single-pane frame lights known as

dutch lights and measuring approximately 4 feet by 2 feet. These lights are screwed, bolted or clipped to a light framework which is usually portable. Houses of this type can very quickly be taken down and re-erected in any place and are used mainly by commercial growers.

Greenhouses may be glazed right to soil level; they may stand on vertical walls of almost any height, or they may have vertical walls partly made of brick, concrete, metal or wood and partly glazed. The last named type is that most commonly found in private gardens, though houses glazed to ground level are gaining in popularity. The merit of a house with vertical walls partly of glass and partly of some solid material is that this method of construction gives good head room inside, even in the smaller widths, and retains the heat better than a house which is glazed right to the ground. If plants are to be grown on stages, there is not much point in having glass below the stage level but if plants are to be cultivated directly in beds of soil on the floor of the house, something is gained by glazing to ground level as plants will get more light and be less liable to become drawn.

Rafters and sash bars of greenhouses may be of wood, steel, aluminium alloy or reinforced concrete. The walls on which the houses stand, or the foundations in the case of those houses which are glazed to soil level may also be of any of these materials or of brick, breeze block or asbestos-cement sheeting. There is something to be said in favour of each of these materials and no doubt something to be said against. Wood is the traditional material for the construction of rafters and sash bars and has the merit of being comparatively cheap, fairly easily replaceable and a good insulator. It suffers from the drawback that in time it will rot, and to prevent this must be fairly frequently painted. Some woods, however, are much more resistant to decay than others and both teak and Western Red Cedar may be expected to last for fifty to sixty years without special treatment. One other slight drawback to wood is that, in comparison with metal, rafters and sash bars must be made of fairly substantial section and this

means that more shade will be cast inside the house.

Steel has the merit of cheapness and strength and steel houses can be constructed of such narrow material that maximum illumination is assured. The principal drawback of steel is that it rusts readily and must be protected with paint even more frequently than wood. Moreover it is a good conductor of heat and therefore steel-framed greenhouses tend to vary in temperature a little more rapidly than those made of wood. In this respect, however, it should be observed that the main loss of heat is through the glass and not through the framing.

Aluminium alloys have most of the merits of steel plus the advantage that good alloys are practically unaffected by the atmosphere once they have acquired their initial corrosion. Maintenance costs are consequently reduced to a minimum and no painting is required. The drawback to these alloys is that they are comparatively expensive and as they are not, as a rule, quite so strong as steel, a somewhat stouter type of construction is required.

As regards walls and foundations, there is much to be said in favour of concrete. It is strong, reasonably resistant to heat and easily kept clean. Bricks probably range second as a walling material and, if properly pointed, are admirable. If, however, the mortar is allowed to fall out, holes and crevices are created which become a harbourage for insects. Breeze block has much the qualities of brick but is not so slightly.

Wood is a better insulating material, thickness for thickness, than either brick, concrete or breeze block, and from this point of view, stout wooden, or, better still, double wooden walls are very good. Unfortunately wood, except for the special kinds already mentioned, decays so rapidly that maintenance costs are heavy.

Steel and aluminium walls both suffer from the drawback that they are not very good insulating materials, though, in this respect, aluminium is better than steel.

From the standpoint of rating, any greenhouse is regarded as a permanent fixture, and is therefore liable to increase the rate-

able value of a property, if it is fixed firmly on a brick, concrete or other permanent foundation. By contrast greenhouses which only stand loosely on their foundations and can be moved readily from one place to another are regarded as tenant's fixtures and do not justify any change in the rateable value.



A typical amateur's span-roofed greenhouse

GREENHOUSE HEATING, see *Heating*.

GREEN MANURING The practice of growing certain crops specifically for the purpose of turning them into the soil at a later date to rot and act as manure. Green manuring is of value for several reasons. It is a good method of maintaining the humus content of the soil. It is also useful to lock up temporarily plant foods which might otherwise be washed out of the soil. For example if a readily soluble nitrogenous fertilizer, such as sulphate of ammonia, or nitrate of soda, has been used rather freely and it is believed, towards the end of the summer, that a considerable quantity remains in the soil, a green manure crop may be sown at once to absorb the surplus plant food. Then when the crop has been dug in and, after a period of some months has decayed, the nitrogen will again become available for a following crop.

In most instances green manuring does not actually enrich the soil in chemicals but only in humus, but if clover, vetches, annual lupins or some other leguminous crop is used, which is capable of making a symbiotic association with nitrifying bacteria, the result will be the addition of

nitrogen to the soil, which may amount to the equivalent of an application of one hundredweight or more of sulphate of ammonia per acre.

The principal crops used for green manuring are mustard, rape, rye grass, annual lupins and vetches. Mustard grows very rapidly and may be sown at the rate of $\frac{1}{8}$ ounce per square yard any time from March until mid-August. Rape can be sown at the rate of $\frac{1}{12}$ ounce per square yard at any time from March to July. Rye grass should be sown at about 2 ounces per square yard at any time from March till July. The season is also the same for annual lupins which are sown at the rate of $\frac{1}{2}$ ounce per square yard. Vetches are comparatively slow in growth and are best sown between March and May at the rate of $\frac{3}{4}$ ounce per square yard. With all these the best time of digging in is just before the plants come into flower. It is an advantage, though not essential, if the ground is dusted with a nitrogenous fertilizer such as nitrate of chalk or sulphate of ammonia at about 2 ounces per square yard when the crop is dug in, as this will hasten the process of decay and improve the quality of the manure produced.

GREEN TIP, see *Bud Stages*.

GREY MOULD A popular name given to some of the diseases caused by the fungus *Botrytis cinerea*. This fungus attacks a great many different kinds of plant and produces different symptoms which often result in distinctive names being given to the disease, e.g. chocolate spot when found on broad beans, dieback when present on roses and gooseberries. Grey mould refers to a particular kind of symptom produced when *Botrytis cinerea* attacks lettuces, strawberries and geraniums. The leaves, or in strawberries the fruits, become soft and may turn black; shortly afterwards a dense greyish, fluffy mould appears all over the diseased area. This disease can be particularly troublesome with the large annual sunflowers grown for their seed, and in a damp season it becomes a difficult matter to harvest the seeds undamaged by grey mould. See also *Botrytis*.

Botrytis cinerea thrives in stuffy, damp atmospheres during wet, dull weather. Under glass it can be avoided to some extent by good ventilation, adequate spacing of plants and careful watering. Both under glass and outdoors it can be checked by dusting plants with flowers of sulphur or spraying them with a good fungicide such as liver of sulphur, colloidal sulphur or Burgundy mixture.

GROWTH SUBSTANCES See *Hormones*.

GUANO Originally guano was a term used exclusively for the deposits left by sea birds in certain rainless or nearly rainless areas of South America, mainly of Peru. Through the centuries the droppings of these birds collected in great quantities, and as there had been little or no rain to wash the goodness out of them, they represented rich stores of plant food. The demand was so great, however, that most of the supplies have long since been exhausted and little genuine bird guano is now available. The term, however, is often used for almost any concentrated fertilizer, and is particularly applied to fish manures which are frequently termed 'fish guano'.

Genuine bird guano, often referred to as Peruvian guano, is a general fertilizer particularly rich in nitrogen and phosphoric acid. An average sample may contain 10 to 14 per cent. of nitrogen, 9 to 11 per cent. phosphoric acid and 2 to 4 per cent. potash. Outdoors it can be used in the final preparation of seed beds etc. or as a top dressing to plants in growth at the rate of 2 to 3 ounces per square yard. It is also very valuable as a top dressing for pot plants or for plants growing in beds of soil in the greenhouse, for which purpose it may be used at the rate of 1 ounce per square yard or a heaped teaspoonful per pot, repeated about once a fortnight while plants are in full growth.

GUMMING All stone fruits such as plums, cherries, peaches, nectarines and apricots are liable to exude resin which is gum-like in appearance. This is most likely to occur if the bark is accidentally injured



Breaking gum from a cherry tree

and often no harm results. There are occasions, however, when considerable quantities of gum oozing from a tree are an indication that it is in poor health. Thus cherry trees that are attacked by bacterial canker often produce large quantities of gum, usually of a rather cloudy character, and close examination will usually reveal a cankered area of bark close to the gum. Sometimes branches that gum badly will be observed to be slowly dying back from the tip and in such cases bacterial canker can frequently be diagnosed by close examination. Gumming also occurs on trees that are in poor condition or that have been too heavily pruned. The gum itself is not harmful and no steps need be taken about it, but trees that are gumming should always be carefully examined in case of more serious trouble. There is no very satisfactory method of controlling this disease, though an application of Bordeaux mixture just before the leaves fall in the autumn, is of some benefit.

Gum may also appear on cucumber fruits, and here it is a symptom of the disease known as gummosis and is caused by a fungus. Dark sunken spots first appear on the fruits and it is from these that an amber coloured gum exudes. Later a velvety, olive grey mould may grow on each spot and the fruits commence to split. The remedy for this is to increase ventilation and to dust the plants with flowers of sulphur. The disease is not likely to occur if a cucumber bed is sufficiently porous and well drained.

GUMMOSIS, see *Gumming, Cucumber*

GYP SUM The popular name of sulphate of lime. This has sometimes been recommended as a chemical to be sprinkled on manure heaps to fix free ammonia and so prevent unnecessary waste of nitrogen. Whether it is ever used in this way seems doubtful and there is even a possibility that, if used, calcium sulphide might be formed and that this would be harmful to plant life.

HALO BLIGHT A disease of beans also sometimes known as halo spot. It is caused by a bacterium and the outward symptom is the appearance of small angular spots on the leaves. These spots are at first water-soaked and later become dry and brown. In severe attacks the whole plant may collapse. Seeds from affected plants are usually slightly blistered. Such seeds should not be sown. No remedy is known for the disease and all plants that are affected should be burned as soon as the crop has been gathered. Certain varieties show a considerable degree of resistance and these include The Prince, Superlative and Ne Plus Ultra.

HALF-STANDARD, see *Standard*.

HAND-LIGHT Another name for cloche (*q.v.*).

HANGING BASKET A device which enables plants to be grown suspended from the rafters of a greenhouse or over balconies, porchways and similar places. Hanging baskets can be constructed of wood, but nowadays are usually made of galvanized wire except for special purposes such as orchid culture. They can be purchased in a variety of sizes from most dealers in horticultural sundries. Occasionally square baskets are offered but usually they are shaped like a shallow pudding basin.

Before being filled with plants the baskets should be lined with a thick layer of moss, preferably sphagnum moss. The plants are then placed in position and the roots surrounded with an ordinary potting compost of soil, peat and sand, possibly with the addition of some manures or fertilizer as in the John Innes compost (*q.v.*). A great

many plants can be grown successfully in this manner, notably ivy-leaved pelargoniums, pendent begonias, lantanas, *Campanula isophylla*, *Asparagus Sprengeri*, smilax, achimenes, *Rhoeo discolor*, fuchsias, marguerites, heliotropes and *Saxifraga sarmentosa*.



A well-planted hanging basket

Plants in hanging baskets will, as a rule, require watering rather more frequently than those in pots and most certainly should never be allowed to become really dry. Care should be taken not to hang the baskets in very draughty places.

A few orchids can also be grown in hanging baskets, notably those that have a trailing habit or produce their flowers below their leaves as with stanhopea. For these special baskets made of teak strips or slats are usually employed,

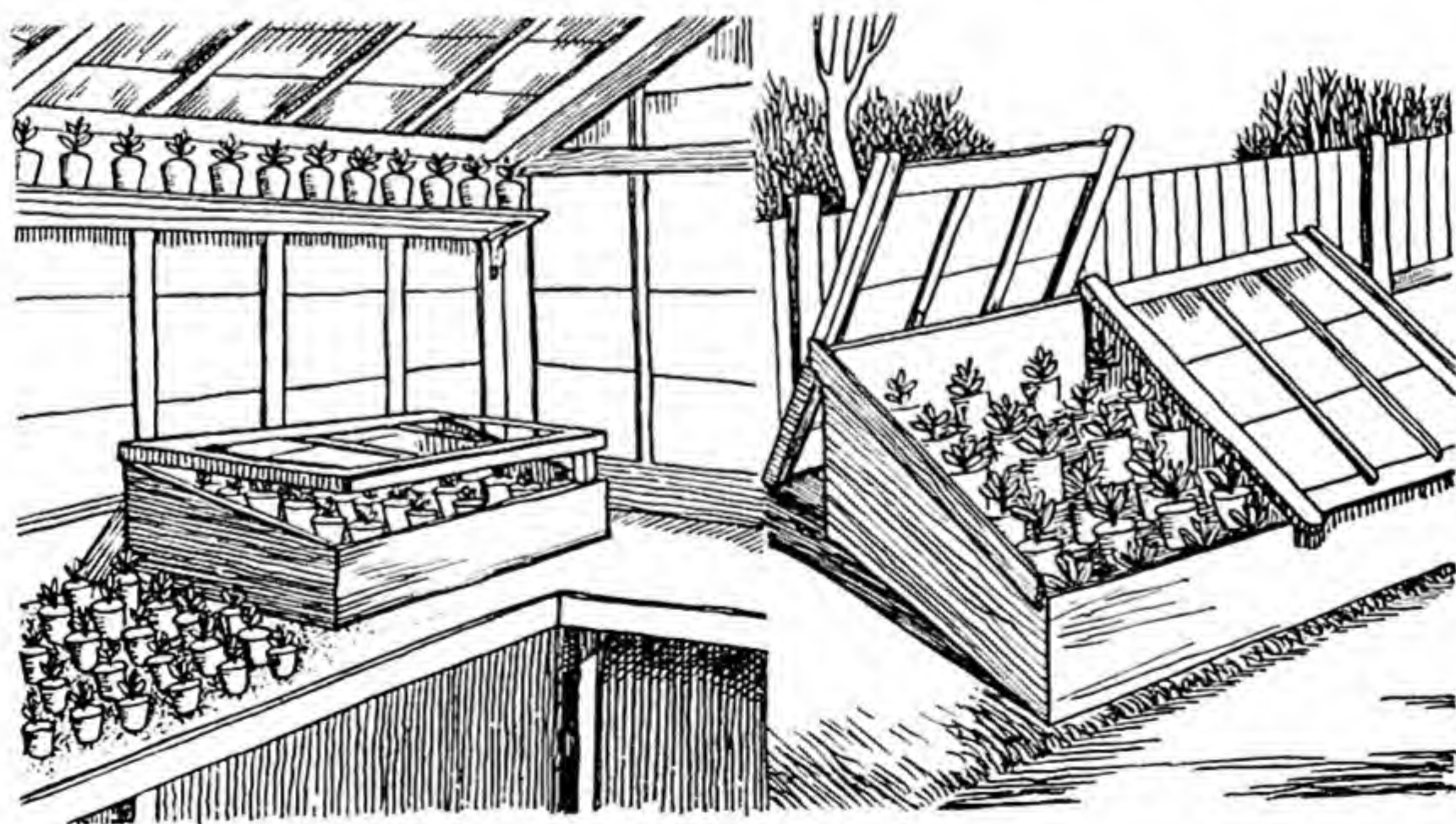
HAPLOID The basic number of chromosomes normal to the sex cells of any particular species of plant.

HARDENING-OFF The process of gradually accustoming plants to a cooler atmosphere than that in which they have previously been grown. If the change from one temperature to another is made too rapidly, plants will suffer a severe check to growth

which may retard them by many weeks or even kill them outright. Hardening off is particularly important when plants are raised in a warm greenhouse for the purpose of being transplanted outdoors later on. The plants should first be moved to the coolest part of the house and then, after a week or so, taken to a frame. The lights of the frame must be kept closed at first but after a few days may be opened an increasing amount on all fine days until eventually they can be removed altogether. If a cold wind is blowing it may be possible to raise the frame lights on the leeward side and so continue to harden off the plants within, without exposing them to chilling draughts. At all times the appearance of the plants must be the gardener's guide as to how quickly he can proceed. If they continue to grow and they remain a normal colour, all is well, but if growth suddenly stops and leaves begin to turn blue or develop brown streaks or blotches, it is highly probable that the change to a lower temperature is being made too rapidly.

HARDY A rather ambiguous term which is applied to any plant which is capable of surviving outdoors without protection throughout the year. Some plants are killed

by a degree or so of frost and these can be unreservedly classified as not hardy. Other plants, however, are not injured until very much lower temperatures are reached, perhaps 25 or even 30 degrees of frost and although such temperatures may occasionally be registered in this country, it would hardly be just, on that account, to describe these plants as not hardy. The trouble is that no completely hard-and-fast line can be drawn. Moreover the behaviour of any one kind of plant may differ considerably according to the soil in which it is growing, the treatment which it has had and the amount of moisture in the soil and air at the time when frost occurs. Many plants which are completely hardy while they remain dormant in winter, are relatively tender when they start into growth in the spring. In consequence if they are encouraged, for example by an early spell of unusually warm weather, to start into growth at an early date, they are quite likely to be injured by frost later on, whereas similar plants which have not made this premature start will come through unharmed. Damage is also more likely to occur if growth is soft through over-rich feeding, or too much water. Plants which are perfectly hardy, may be rendered tem-



Stages in hardening-off plants

porarily tender if they are grown for some time in a greenhouse, but they will recover their hardiness if they are gradually accustomed to cooler temperatures. It is for this reason that plants reared in the greenhouse in late winter or early spring must be gradually hardened off before they are planted out in the late spring or early summer.

The term half-hardy is used for plants which can be grown outdoors during the summer months, but require protection in winter. A half-hardy annual is one which is too tender to be sown outdoors until quite late in the spring, but can be raised in a greenhouse or frame from a late winter or early spring sowing and then be planted out in May or early June.

HASTATE In the form of an arrow-head or halberd. A botanical term usually applied to leaves which are of this shape.

HAULM The stems of certain plants are given this name, notably those of potatoes and sweet peas.

HAY BAND An old-fashioned method of reducing the numbers of codling moths—the moths which are responsible for one kind of grub which eats into apples and feeds in the flesh and core. When the codling moth caterpillar is fully grown, it leaves the fruit and seeks a sheltered place in which to turn into a pupa. If bands of hay or old sacking are tied round the branches or main trunks of apple trees in early summer and left until the autumn, it will be found that many of the caterpillars have formed pupae beneath them. The bands can then be removed in autumn and the pupae collected and burned. Though old-fashioned this method of trapping still has much to commend it.

HEAD Botanically this term is used to describe a dense cluster or a short dense spike of flowers. Gardeners often use it in a much looser sense to cover such unrelated objects as a head of lettuce, a head of cauliflower, a head of cabbage, a head of celery, meaning thereby one well developed specimen of the vegetable named.

HEADING BACK The process of cutting back trees or shrubs very severely by shortening some or all of the main branches. When young fruit stocks are cut back to receive grafts in spring, the operation is referred to as 'heading back', in fact the term may be used for any drastic pruning or pollarding. Dehorning (see *Pruning*) is a mild form of heading back.



Heart rot of celery

HEART ROT A name given to various internal decays of root crops, celery, etc. of which the two commonest are soft rot (*q.v.*) and brown heart (*q.v.*).

HEART-SHAPED A term synonymous with cordate and used, as a rule, to describe leaves which have pairs of basal lobes giving them roughly the form of the heart on a playing card.

HEART WOOD The innermost and

hardest wood of the branch or trunk of a tree.

HEATING Heating is of importance to the gardener for four reasons—(1) to enable him to cultivate plants which are not sufficiently hardy to be grown without some extra heat at certain times of the year; (2) to enable him to grow plants out of season; (3) to enable him to dry the atmosphere and so accommodate certain plants which resent damp conditions and (4) to stimulate the production of roots, a matter which is particularly important when cuttings are being struck. For these four purposes a great quantity of equipment of different types exists, and it is important to choose the kind most suitable for the particular end in view.

Heating apparatus may be classified in two ways—first according to whether it is required to heat the air or the soil and secondly according to the type of fuel to be consumed.

Air heating is most important for the purposes (1), (2) and (3) above, that is for the protection of plants against cold, for the cultivation of plants out of season, and for the drying of the atmosphere. Soil heating is also valuable for purpose (2) either on its own or in conjunction with air heating, and is also most important for purpose (4), namely to stimulate root growth of cuttings. Combined with air heating, it is also of great value in raising early seedlings of many kinds of plants particularly those that are tender or half-hardy.

The principal fuels available are coal, coke, sawdust, gas, electricity and paraffin oil. Coal and coke have the merit of cheapness and the drawback that much of the apparatus designed for their combustion demands more attention than that required for other types of fuel, with the exception of sawdust. For stoking large coal and coke boilers, it is usually possible to install a mechanical stoker of some kind which may even be automatically controlled to stoke the boiler in accordance with the varying demands made upon it by fluctuating temperatures. Automatic stokers are not as a rule available for the small installations usually required by amateurs.

Sawdust can often be obtained almost for the asking and so is probably the cheapest fuel of all but it cannot be burned in an ordinary boiler. However, special sawdust-burning boilers can be obtained and where this fuel is readily available, they may certainly be considered on the score of economy.

Gas-fired boilers are in general a little more costly to run than those using coal or coke as fuel, but they have the merit of cleanliness and are very labour-saving—in fact if the burner is fitted with a thermostatic control and a pilot jet, they can be left to run without attention for weeks on end.

Electricity is as a rule, more costly than gas, though naturally this will depend on the local price charged for current. At anything over 1d. per unit it is definitely an expensive fuel but at less than 1d. per unit it is economical. It is even cleaner and more labour-saving than gas and a suitably installed electric heating apparatus with thermostatic control will require hardly any attention at all. Moreover all danger of damage from fumes is eliminated. This makes electrical apparatus even more fool-proof.

Paraffin oil is not a particularly cheap fuel to use if one is considering fuel consumption in relation to heat produced, but small oil stoves, adequate to keep frost out of small greenhouses, can usually be run for quite a modest cost. Moreover the stoves themselves usually compare very favourably in cost with apparatus designed for any other fuel and are readily portable from one greenhouse to another. The principal drawback of paraffin oil as fuel is that, even with the best designed apparatus, there is always some danger that fumes may be liberated in the house. Some plants are very sensitive to such fumes and easily scorched by them. The danger is greatly increased if the stoves are not kept scrupulously clean, if they are subjected to draughts, or if poor-grade paraffin oil is used.

For soil warming, electricity is the fuel most commonly used, though hot water pipes from a boiler heated by coal, coke or gas, may be used. Yet another method of

warming soil is by a heap of decaying horse manure which is described under the heading—Hotbed (see page 128).

Coal and Coke Boilers Many patterns and sizes are manufactured, from small boilers with a horseshoe-shaped water jacket surrounding the fire grate, to large tubular boilers similar to those used in factories. With almost all the smaller installations the heat is used to warm water which is then conducted round the house in pipes by the thermosyphon system. This depends on the fact that warm water tends to rise and cold water to sink; in consequence if a pipe is connected to the top of the water jacket surrounding the boiler and is led from this point steadily, though not necessarily steeply, uphill to the furthest point which is to be heated, after which it is allowed to run downhill to the lower part of the water jacket, the water when heated in the boiler will, of its own accord, circulate round the pipes without any mechanical assistance. The essential point in the thermosyphon system is that the rise and fall of the pipes must be continuous though not necessarily always at the same inclination. If the pipes switchback, air pockets may be formed in them and the flow of water will be impeded or stopped. Another important point with any hot water system is that at some point there should be an expansion box or pipe to allow for the expansion of the water as it is heated. Without this the pipes will be subjected to considerable pressure and will either burst or leak at the joints.

Generally, pipes 4 inches in diameter are used for hot water installations in small greenhouses but occasionally 2-inch pipes are employed. These, however, are far less efficient than the larger diameter pipes. It is always wise to install a boiler a little larger than is absolutely necessary, according to maker's specifications, to heat the house in which it is to be installed. This will give some reserve of heat so that the boiler is never pushed to its capacity. For a small house not exceeding 12 feet in width, it is usually sufficient to have one 4-inch diameter flow pipe and one 4-inch diameter return pipe running the length of the house. If, however, it is intended to grow hothouse

plants requiring temperatures of over 60 degrees, even in winter, the pipes should be carried round three sides of the house. This is also the best form of installation for houses much over 12 feet in width.

If the house is required mainly for the protection of tender or partly tender plants, the heating pipes should be kept fairly close to soil level, but if the purpose is mainly to dry the atmosphere, as for example when growing perpetual flowering carnations, the pipes may with advantage be slung from the the roof rafters only a few inches below the glass itself. This will secure the necessary circulation of air without warming the atmosphere too much.

It is always desirable to have the fire and draught doors of a boiler protected to some extent. In large installations the whole boiler is usually accommodated in a pit dug some feet below soil level. For small boilers this is seldom possible, but it may be practicable to place a potting shed at the end of the greenhouse and have the boiler in this shed. If this cannot be done, a small shelter may be built round the boiler. If wind can blow directly on the boiler, the draught may vary considerably from hour to hour and the rate of fuel consumption (and therefore the amount of heat generated) will also vary according to the draught.

Sawdust boilers These are usually employed in exactly the same way as coal and coke boilers to heat water which is circulated by the thermosyphon system and in consequence the same precautions for installation should be observed.

Gas-fired boilers Gas-fired boilers are also, as a rule, connected with pipes circulating water on the thermosyphon system and the only difference in installation is that, as the gas heating is less sensitive to draughts than a coal or coke fire, the precautions for protecting the boiler need not be quite so stringent. Great care should be taken, however, to see that an escape pipe for fumes from the gas boiler is carried well above the house since gas fumes can be very harmful to plants.

Electrical heating This may be applied in a number of ways. One of the most popular is the low temperature tubular radiator,

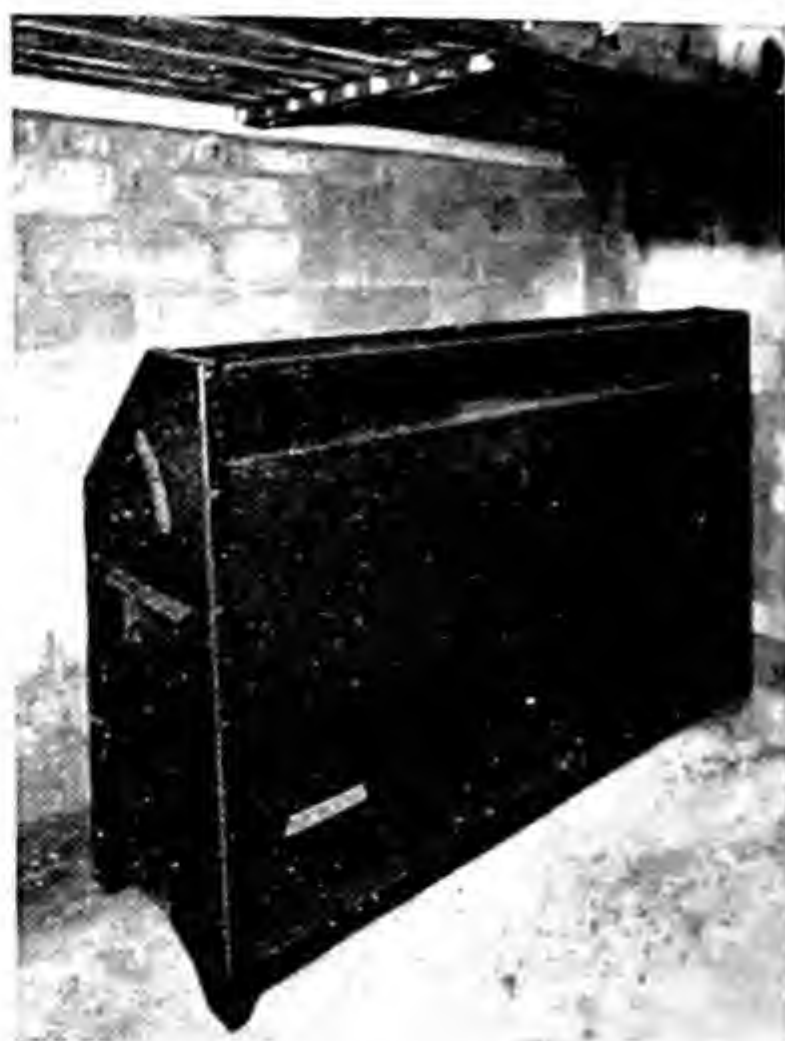
which outside looks rather like a small-diameter hot water pipe, but in fact consists of electrically heated elements without liquid of any kind. Even when running at full consumption these heaters do not become so hot that the naked hand cannot be placed on them for a few seconds. In consequence the heat is not too concentrated as it is when using incandescent elements such as those contained in most domestic stoves. The electric loading of these tubular heaters is usually 60 watts per foot and 10 feet will give sufficient heat to exclude frost from a greenhouse 250 cubic feet in capacity. Twice this length of pipe will heat a greenhouse of twice the capacity and so on. If a minimum temperature of 45 degrees Fahrenheit is required it is desirable to double the amount of pipe.

It is always advisable to connect electric air heaters with a thermostatic control, which will switch them off as soon as the desired temperature is attained and switch them on again immediately the temperature falls below this predetermined level. This thermostat not only ensures much more efficient heating, but also effects great economy in fuel consumption.

Another type of electric air heater is the convection heater so designed that a current of warm air is delivered from the stove into the greenhouse. Several patterns exist and manufacturer's instructions should be followed as regards both installation and selection of a suitable size.

Yet a third method of applying electric heating to the greenhouse, is by using low voltage strip heaters. These are naked elements through which a current is passed at so low a voltage that no harm will be done, nor indeed any shock felt, if the element is touched with the naked flesh. Heaters of this type necessitate the use of a transformer, which is a slight drawback as not only are transformers fairly expensive but also the introduction of a further piece of apparatus increases the possibility of something going wrong. Nevertheless, the strip heater is extremely safe and efficient and for this reason should be seriously considered.

An adaptation of the strip heating idea is frequently applied to soil warming. This



A greenhouse convection heater

consists in a transformer warming a length of naked galvanized wire, which is laid in a zigzag 6 to 8 inches below the surface of the soil. Current is usually supplied at 6 volts, but occasionally 12 volts are used and sometimes up to 25. In all methods great care should be taken to see that the transformer is of a suitable type and properly protected from damp. It is very desirable to use specially manufactured apparatus and not to attempt home-made installations. Soil warming of this kind is usually applied on the dosage system, i.e. no thermostat is employed, but the current is switched on for a specified number of hours per day according to the requirements of the crop. It has been found that it makes no difference to the crop whether a certain degree of heat is applied throughout the 24 hours, or twice that degree for 12 hours or even three times that degree for 8 hours with no heat at all during the remaining hours. The sole essential feature is that the right total amount of heat should be transmitted to the soil.

Another method of electric soil heating is that employing a high-tension soil-warming cable, that is to say, a cable thoroughly insulated and designed to become warm when the ordinary mains voltage of 220-

240 is passed through it. The advantage of this system is that it cuts out the expense and complication of a transformer. The drawback is that the danger of accident is considerably increased, for if the insulation should be penetrated (as, for example, by a spade or fork) while the apparatus is in use, the current released will be sufficient to cause a severe shock.

Paraffin oil Two principal forms of oil heater are available, the blue flame and the white flame. The former has a much greater degree of efficiency and is, in general, to be preferred, though it is perhaps a little more temperamental and a little more likely to be put out of steady burning by draughts than the less efficient white flame heater. No general data concerning the size of heater required for any given size of house can be given and manufacturer's instructions should be obtained on this matter. As with coal and coke boilers, it is always wise to install a larger heater (or more heaters) than appears necessary to warm the house to the degree required. Scrupulous cleanliness must always be maintained, and particular care should be taken to see that the air vents round or below the wick are quite clear. There should be no smell in the house when the heater is operating.

HEDGE A term applied to any continuous line of shrubs planted with the intention of forming a boundary or a division in the garden. Many hedges also serve the purpose of windbreaks and in very exposed gardens it may well be that the establishment of such a windbreak must precede most other planting.

Although the popular hedging plants are comparatively few in number, hedges can be formed of a great many shrubs and, indeed, it is difficult to exclude any kind so long as it is properly handled. However, the ideal hedge shrub should fulfil the following conditions. It must be capable of growing well, even when planted with neighbours jostling it closely on either side. It should be freely branched and not sparse in habit. It should start to branch close to ground level and maintain its foliage at the base even when it has grown to a considerable height. Further, it must be amen-

able to fairly severe pruning and even frequent clipping. It is an advantage, though not essential, that it should be evergreen. Beech and hornbeam are popular because although they are deciduous, they have the peculiarity of holding their dead leaves throughout the winter when they are grown as hedges.

The most favoured hedging shrubs are privet, particularly the broad-leaved form (*Ligustrum ovalifolium*), the variegated privet (*Ligustrum ovalifolium variegatum*) and golden privet (*Ligustrum aureum variegatum*); *Lonicera nitida*; box (*Buxus sempervirens*); holly (*Ilex Aquifolium*); cherry laurel (*Prunus Laurocerasus*); Portugal laurel (*Prunus lusitanica*); *Aucuba japonica* and its variegated form; *Euonymus japonicus* and its variegated form; yew (*Taxus baccata*), with the fastigate form known as Irish yew and the variegated form (*Taxus baccata variegata*); *Cupressus Lawsoniana* and its several forms, notably *Allumii* and *erecta viridis*; *C. macrocarpa*; *Thuja plicata*, frequently known as



A well-trimmed hedge

Thuja Lobbii; *Thuja occidentalis*; beech (*Fagus sylvatica*); hornbeam (*Carpinus Betulus*); hawthorn (*Crataegus monogyna*); and Myrobalan plum, (*Prunus cerasifera*). In addition *Tamarix anglica* is often used in seaside areas and so is *Airiplex Halimus* which, though rather untidy in growth, has the merit of thriving in very poor sandy soils and withstanding the most salt-laden gales. The common gorse (*Ulex europaeus*) is also a good hedge subject on sandy soil and in seaside areas. Flowering hedges are often formed of various species of berberis,

notably *Berberis Darwinii* and *Berberis stenophylla*, and sometimes of roses, particularly sweet briars, hybrid musk roses and the more vigorous hybrid polyantha varieties, though sometimes rambler roses are trained along wires to form a kind of hedge or screen. *Rosa rugosa* and its hybrids are also used to form large hedges which do not need to be cut to too formal a shape.

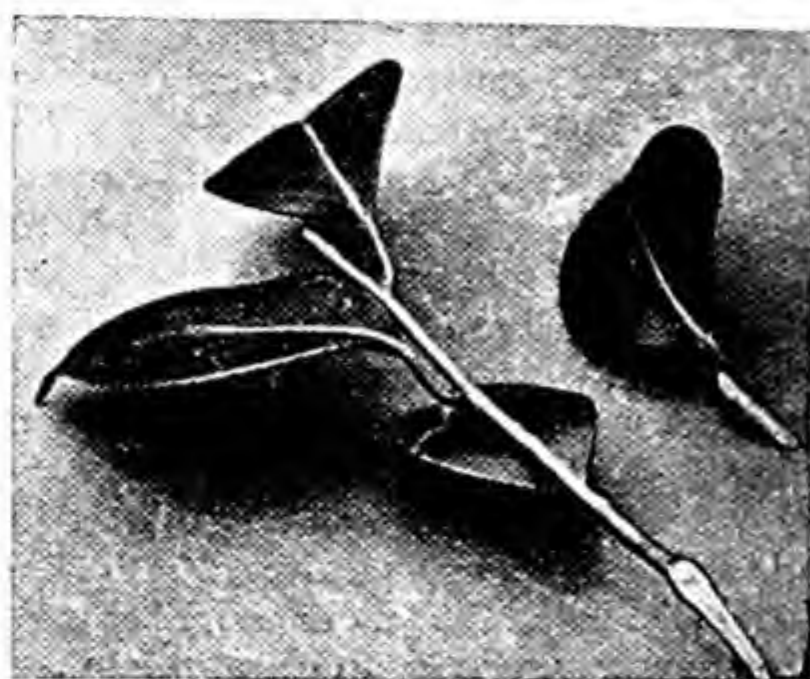
Before planting it is important to prepare the soil really well as, once the shrubs are planted, further cultivation of the soil will become practically impossible. Nevertheless, hedges should be fed, even when they have been established for many years, and this can be done by giving an annual top dressing of rotted dung, or of a good compound fertilizer used according to manufacturer's instructions.

The frequency of clipping or pruning and the time at which this work should be done will depend very much on the purpose for which the hedge is required and the material of which it is composed, but in general it can be said that evergreen hedges should be clipped occasionally from May to September and that any hard cutting required, should be done in May, whereas deciduous hedges should be pruned mainly in autumn or winter.

Broad-leaved hedges, such as those of cherry laurel and aucuba, should never be clipped with shears but always pruned with secateurs or a knife, the reason being that the shoots themselves should be cut and not the leaves, for if the latter are damaged with shears they look very unsightly. It is nowadays possible to reduce the labour of hedge clipping very considerably by making use of one or other of the mechanical devices available for the purpose, such as portable electric hedge clippers.

HEEL When a cutting of a plant is prepared by pulling a side shoot away from the main shoot from which it grows, the small strip of bark and wood which will be dragged away from the main shoot and remain attached to the bottom of the cutting, is referred to as a 'heel'. In consequence this type of cutting is sometimes called a 'heel cutting'. As a rule it is the practice to trim the heel close back to the

base of the shoot before it is inserted. The heel should not be removed altogether. Some cuttings seem to strike more readily or with greater certainty if taken with a heel, whereas others do better if prepared entirely from young growth with no older wood attached at the base. Unfortunately, there are not sufficient data available to say which plants respond best to either method.



A hard wood cutting with a heel

HEELING-IN The process of planting temporarily until permanent planting can be undertaken. If the plants arrive from the nursery or elsewhere during bad weather or when for any other reason it is inconvenient to plant them in their final positions a trench may be dug out in any convenient place and the plants arranged close together with their roots in this. The soil can then be returned and made firm over the roots with the foot. Plants heeled-in in this manner will usually remain in good condition for several weeks.

HELLEBORE An insecticide obtained from the roots of certain plants. It is fairly effective against caterpillars, weevils, beetles and their larvae and many other harmful insects. It can be purchased as a dust mixed with a suitable carrying agent and ready for application, or as a powder to be dissolved in water at the rate of 1 ounce per gallon. The liquid spray is rendered more effective if a proprietary spreader is added as advised by the manufacturer, or 1 ounce of soft soap is added to each gallon of spray fluid.

HERB This term has two distinct meanings. It is applied to those savoury vegetables which are grown principally for the seasoning of foods, e.g. sage, thyme, parsley, and also to any plant which has soft growth in contradistinction to woody growth. In this sense it is synonymous with herbaceous plant. A herbaceous perennial is a plant of this character which also continues to grow from year to year.

HERBACEOUS, see *Herb*.

HERBACEOUS BORDER A border set apart mainly or wholly for the cultivation of herbaceous perennials. As a rule the plants are arranged in irregular groups of a kind, carefully chosen not only for colour harmony or contrast, but also either to flower all at one time or else to flower successively in such a manner that the later flowering groups tend to grow up and screen those plants that have flowered earlier. Plants of different heights will also be used in such a manner as to give the border a pleasing contour.

A great deal of ingenuity can be shown in the arrangement of plants in a herbaceous border, and there is scope for almost infinite variation according to the fancy of the gardener. As a rule an irregular and outwardly informal herbaceous border is really as much an artifact as the most elaborately designed piece of geometric 'bedding out' (and much more difficult to carry out successfully) and its purpose is much the same—to associate plants in an effective, and even spectacular manner so that each kind is displayed to the best possible effect.

While no hard-and-fast rules can be given regarding the planning and planting of herbaceous borders, the following general suggestions can be made. Narrow borders are difficult to plan effectively. Five feet may be regarded as the minimum width for a border which is to be viewed from one side only, and nine feet for a border which is to be viewed from both sides. The plants should be arranged in irregular groups, not in straight lines. While the taller plants will, in general, be kept towards the back in single-sided

borders and in the middle in double-sided borders, there should be no rigid division, but, instead, some groups of the taller kinds should be brought forward to give an irregular contour and split the border up into a series of bays of varying height.

When planning colour associations care should be taken to see that the plants under consideration will flower at the same time. It is easy to spoil a scheme if flowers which were meant to set one another off flower successively instead of together.

As a rule it is easier to adopt a pleasingly irregular arrangement of the various groups if they are themselves composed of irregular numbers of plants of each kind.

The groups themselves should in general be longer than they are broad, as narrow drifts are more easily concealed when they pass out of flower than are broad ones.

HETP The abbreviation commonly used for hexethyltetraphosphate, a chemical that is used as an insecticide. It is particularly useful for destroying aphides as, unlike nicotine, it is as effective in cold weather as in hot. It is a liquid which must be diluted with water before use, the usual strength being $\frac{1}{2}$ fluid oz. to 6 gallons of water, plus a similar quantity of wetter. HETP is very poisonous to warm blooded animals including human beings and can be absorbed through the skin. Where exposed to moisture it soon decomposes and plants sprayed with it are unlikely to be poisonous after a few days.

HIP (or **HEP**) The fruit of a rose.

HIRSUTE Hairy. A botanical term used to describe the coarse or rough hairs which are to be found on the leaves or stems of some plants.

HISPID Bristly. A botanical term used to describe the stiff hairs or bristles which are to be found on the leaves or stems of some plants.

HOARY A botanical term used to describe leaves or stems which are covered with dense, short, white or whitish hairs

giving them the appearance of being frosted.

HOE A tool designed to cut through the surface soil, so breaking it up and destroying any weeds which may be growing in it. Many different patterns are made; they may be broadly divided into two main types, the dutch hoe and the draw hoe.

The Dutch hoe The Dutch hoe has the blade set nearly in the same plane as the handle and it is used by pushing the handle forwards, with the whole blade almost flat on the soil. The blade is then drawn back ready for a second stroke and at the same time, the operator moves slowly back. In this way the surface soil is cut up and is not walked on after it has been hoed.

The draw hoe The draw hoe has a blade set almost at right-angles to the handle and it is used with chopping motions, the blade at the same time being drawn towards the body. In other words the cutting stroke is made in the reverse direction to that used with the Dutch hoe. At the same time the operator moves slowly forward across the ground and so walks on the soil that has

just been hoed. This is a minor drawback to this type of hoe, but advantages which may be claimed for it are greater control and more power. In consequence the draw hoe is the better type to use when working very closely around plants, particularly those that are planted irregularly, and also when working on hard ground or amongst a dense growth of weeds.

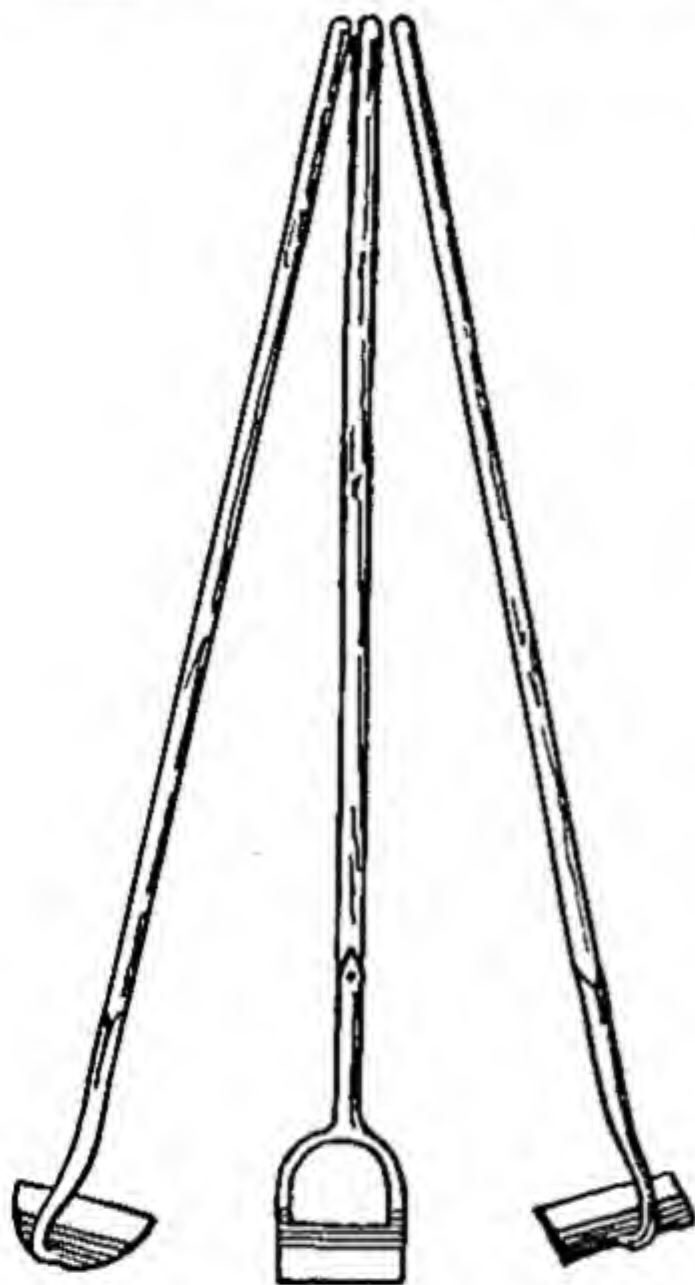
The Dutch hoe can be obtained in a great many sizes varying in width from very small hoes, usually known as 'spuds', not more than an inch in breadth, to wide hoes which may measure as much as 10 inches across. For practical purposes the 4-inch, 6-inch and 8-inch hoes will be found serviceable. One type of Dutch hoe known as the Sproughton hoe, is attached to the handle on one side of the blade only and in consequence can be worked very much more closely round plants. Another special type of Dutch hoe has a 'blade' formed of a piece of steel wire drawn very tight. This reduces the friction of the soil to a minimum and is claimed to make for easy work. The wire is readily replaced when it wears out.

Draw hoes are also manufactured in many different forms, one of the most popular being the swan-necked hoe, which has a blade shaped like a half moon and a steel shaft shaped in a curve like a swan's neck, which attaches it to the wooden handle. Another type has a rectangular blade and is attached to the handle by a steel stirrup, and in a variation of this pattern, the blade fits into slots in the stirrup and is easily removed with a tap from a hammer for replacement when worn out. What is virtually a modification of the draw hoe, is a type known as the Canterbury hoe in which the blade consists of three fork-like prongs attached to the handle at right-angles. It is very useful for breaking up rough ground and can also be used for dragging out surface rooting weeds such as grass.

Yet another variation of the draw hoe is the so-called onion hoe which resembles a very small swan-necked hoe and has a handle only about $2\frac{1}{2}$ feet in length. It is intended to be used with one hand, close round plants and gets its name from the fact



Canterbury hoe



Left and right: *draw hoes*; centre: *Dutch hoe*

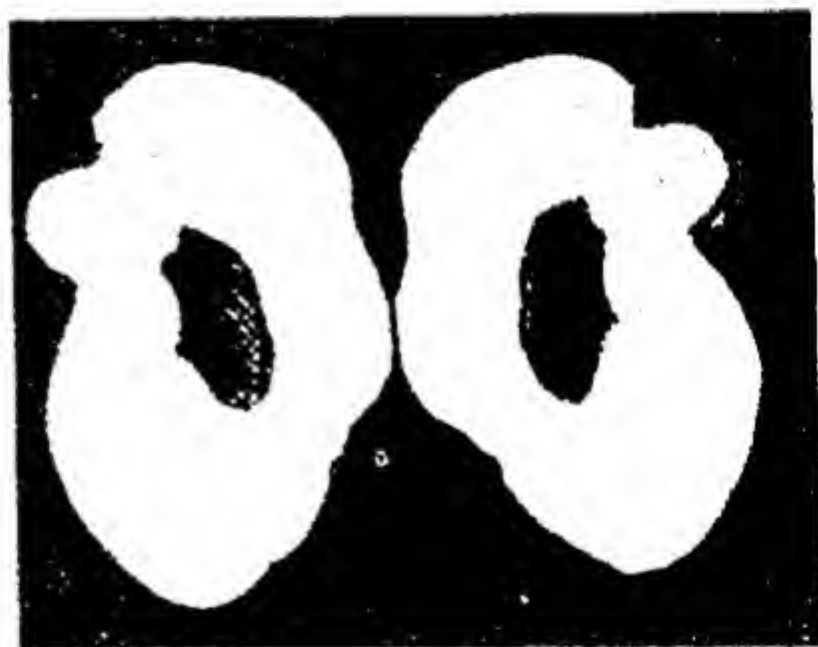
that it is frequently used for thinning and weeding onions.

Hoeing is one of the most important aspects of soil cultivation. Its main purposes are to break up the surface soil, so admitting air, and to destroy weeds. There is considerable controversy whether it also has the effect of conserving soil moisture by leaving a layer of loose soil on the top and so preventing moisture, which is rising in the soil by capillary attraction, from reaching the surface and being lost by evaporation. Various scientific tests have been carried out to test this matter and these all appear to show that hoeing is not of any practical value for this particular purpose. It should not be overlooked however, that weeds, if left to grow, will waste a great deal of soil moisture and hoeing is usually the quickest and most effective method of getting rid of weeds in the garden.

To be effective in destroying weeds, it is desirable that they should be cut off just

below soil level and not merely dragged out of the soil, in which case they might easily take root again. In order that this cutting may take place, it is essential that the whole blade should be kept really sharp, in consequence it is desirable for the gardener to carry a small file with him when hoeing and from time to time to use this to sharpen the cutting edge.

HOLLOW HEART A trouble sometimes experienced with potatoes. The tubers, instead of being solid throughout, are hollow in the centre. This condition is not caused by an infection or by the attack of any insect, but appears to be due to soil and climatic conditions. It is most likely to occur when extremes of dry and wet weather follow one another quickly during the growing season. Varieties of potato which normally make very large tubers are most likely to suffer. Good preparation of the soil will help to prevent this disease occurring. Where it has proved troublesome, varieties known to make very large tubers should be avoided.



Hollow Heart

HOOF AND HORN A valuable nitrogenous manure can be made by grinding hooves and horns to a fairly fine powder. Because of its organic origin this fertilizer has a more beneficial effect on the texture of the soil than inorganic nitrogenous fertilizers. The more finely the hooves and horns are ground up, the more rapidly will the nitrogen they contain be liberated in the soil.

An average rate of use is 2 ounces per square yard, or it may be used in potting soils at the rate of $1\frac{1}{2}$ to 4 ounces per bushel. This fertilizer can be applied at any time of the year and may be used for any plants which require nitrogenous feeding.

HOPS Spent hops can sometimes be purchased at a reasonable price from breweries and if allowed to stand for a few months, become a valuable source of humus which can be dug into the ground in place of animal manure or compost. The rate of dressing should be similar to that for animal manure, namely about a barrowload to 6-12 square yards. As the hops decay in the soil, small quantities of nitrogen and other plant foods will be liberated, but the manurial value of hops in this respect is comparatively small. Their principal use is in improving the texture of the soil by enriching it with humus.

Hop manure is the name given to spent hops which have been treated with various chemicals to increase their value as plant food. Because of this chemical treatment, hop manure is richer than spent hops and for the same reason it must be applied much more sparingly. The actual rate of application will vary according to the proprietary brand being used, and may differ from as little as 4 ounces to as much as 12 ounces per square yard.

Spent hops can be applied at practically any time of the year but as hop manure is usually treated with soluble fertilizers such as sulphate of ammonia and superphosphate of lime, it is more economical to apply it in spring as a top dressing or pricked into the surface soil.

HORMONES A name given to certain organic chemicals, some of which are formed naturally in the tissues of plants, which exercise a controlling influence on some aspect of growth or development though they are not themselves plant foods. Hormones may initiate some vital change in the plant without actually taking part in it. For example, if a very dilute solution of alpha-naphthalene-acetic acid is smeared on the stem of a tomato plant, roots will

develop on that part of the stem, though the chemical is not itself used in the formation of roots. Similarly the production of minute quantities of hormone in the fertilized fruits of an apple or pear causes the fruit to develop and become fleshy, though the hormone is not one of the essential chemicals used in the development of the fruit.

Hormones artificially applied enable the gardener to promote changes in the development of plants at times of the year, or under conditions, when they would not normally occur. In some instance the hormones must be extracted from plants, but frequently they can be produced synthetically. Some synthetic chemicals, not identical with those produced by plants, will nevertheless cause identical or very similar reactions. This is true of the chemical already referred to, alpha-naphthalene-acetic acid which is not a substance normally found in plants but is nevertheless as effective as natural hormones in promoting the production of roots. In this instance two methods of application are possible. One is to prepare a very dilute solution of the chemical and apply this to those parts of the plant on which it is desired roots should form; the other is to mix the chemical with a carrying powder which can be sprinkled on that part of the plant. These root-forming hormones are now frequently used to hasten the rooting of cuttings. When a cutting has been trimmed and prepared it is either dipped in the powder containing the hormone or it is immersed in a dilute solution of the hormone about $\frac{1}{4}$ inch deep and left there for 12 to 15 hours after which it is washed in clear water.

It has been found possible, by spraying suitable hormones on the open flowers of fruit trees, to induce the formation of fruits even when fertilization has not occurred or has been rendered impossible by the destruction of stamens and stigmas by frost. Unfortunately this technique has not given consistently satisfactory results and as a rule the fruits develop only partially and do not reach full size.

More successful has been the prevention of premature falling of apples and other

fruits by spraying them in August or September with a suitable hormone solution. This has proved particularly useful for varieties of apples, such as Beauty of Bath, that are subject to a very heavy drop of fruit before the fruits are fully ripe.

Hormones can also be used to retard growth and have been applied to potatoes in store to prevent premature sprouting.

If hormones are applied in excess they will check or kill plants and as some plants are much more sensitive to this effect than others, it has proved possible to use hormones as selective weedkillers. Grasses have proved more resistant than broad-leaved weeds to excess application of certain hormones and if the dose is carefully controlled, these hormones can be used to kill the weeds on lawns with little or no check to the grass. These useful plant hormones can all be purchased in proprietary formulations which should be used strictly in accordance with manufacturer's instructions.

Among the chemicals most commonly used as plant hormones are the following :

For root formation Alpha-naphthalene-acetic acid, indolyl-butyric acid, beta-indolyl-acetic acid and naphthoxyacetic acid. The first three are generally used at strengths of from 10 to 25 parts per million for herbaceous plants, 30 to 60 parts per million for half-ripened shoots of shrubs and trees, and 60 to 200 parts per million for hard-wood shoots. Naphthoxyacetic acid is used at still lower concentrations ranging from 2 parts per million for herbaceous plants to 25 parts per million for hard-wood cuttings.

For fruit formation Indolyl-butyric acid at 50 to 100 parts per million, beta-naphthoxyacetic acid at 40 parts per million.

To prevent fruit drop Alpha-naphthaleneacetic acid at 10 parts per million.

To retard growth Methyl alpha-naphthalene acetate one part, to ten thousand parts (by weight) of potatoes.

To kill weeds Dichloro-phenoxyacetic acid (DCPA, or 2 : 4 D) and methyl chlorophenoxyacetic acid (MCPA) at the rate of 1 pound per 1 hundredweight of

carrier. Both these chemicals can also be purchased in liquid form. These proprietary formulations must be used strictly in accordance with manufacturers' instructions. This also applies to another hormone weed-killer, 2 : 4 : 5-T.

HORSE MANURE This is one of the most valuable of all the animal manures, both because it is comparatively rich and well balanced in nitrogen, phosphate and potash and also because it is light in texture and in consequence excellent for improving the porosity of heavy soils. Moreover, fresh horse manure is one of the best substance from which to form a hotbed (*q.v.*), and is also the only animal manure that is reliably satisfactory for mushroom beds.

Horse manure can be used safely for all plants and crops for which animal manure is desirable. It can be applied at practically any time of the year, but it is usually rather wasteful to use rotted horse manure in the autumn on light sandy soils, as much of the goodness may be washed out before crops are ready to use it the following spring and summer. On such soils it is usually best to use horse manure in late winter or early spring unless it is fresh, when it should be given more time to decay in the soil before crops require to make use of it. Rates of application on all types of soils may vary from a barrowload to 6 square yards to a barrowload to 12 square yards.

HOSE Garden hose for conveying water is made in various diameters from 1 inch upwards and of either rubber or plastic. Measurement of hose is always of the aperture and does not take into account the thickness of the material of which it is constructed. Plastic hose has the merit of being extremely durable but is not quite so flexible as rubber hose. When hose is intended to take high pressure, as for example, when it is used for high pressure spraying, it is reinforced with canvas. Neither rubber nor plastic hose should be subjected to frequent and sudden changes of temperature nor should either be left outdoors during frosty weather. When not in use it is best rolled on a special reel and placed in a cool, dark place.

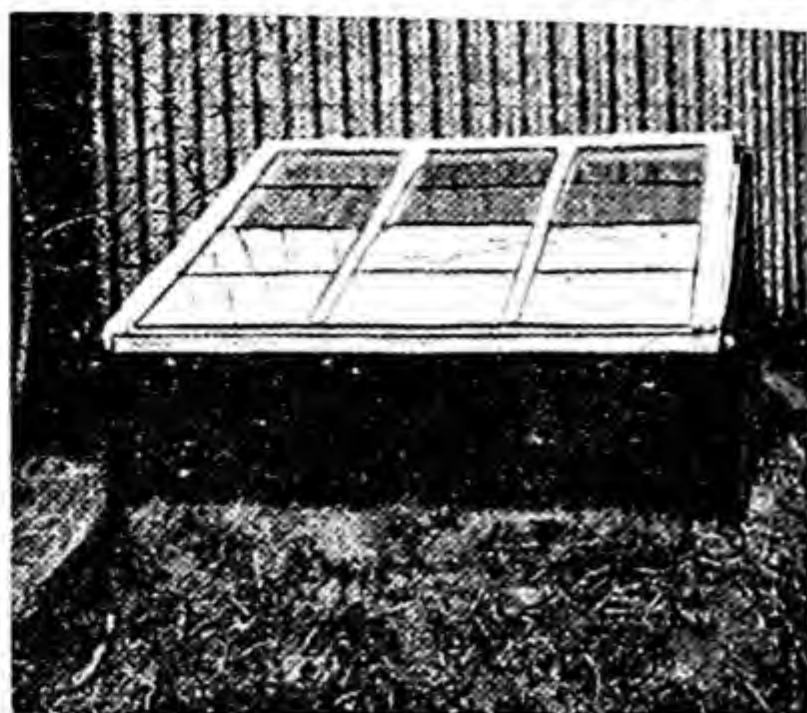
HOSE-IN-HOSE A term used for a type of abnormality which sometimes affects flowers, particularly those of primroses, cowslips and mimulus. In these abnormal forms the bloom appears to be duplex, one perfect flower being carried inside another. Sometimes these hose-in-hose varieties have considerable beauty and have been selected and cultivated as garden plants.

HOTBED An old-fashioned but excellent method of warming soil in order to encourage the early production of crops. Hotbeds are usually made from fresh horse manure, but they can also be prepared from horse manure mixed with dead leaves and also from straw or chaff treated with one of the numerous rotting agents which usually contain nitrogen and lime.

The method of making a hotbed with manure is to build it into a flat-topped heap and tread it down firmly. The manure used should, for preference, contain a fair amount of straw and the fresher it is the better. Throw it into a conical heap, wetting any portions that appear to be dry as this is done. After a few days the heap will generate a lot of heat and may then be turned, the inside portions being brought outside and the outside turned in. Again the heap will heat up and again it should be turned.

A few days later it should have become sufficiently decomposed to allow the hotbed to be built. It is usual to cover it with a frame or frames and the size will therefore be determined by the size of the frame or frames which are to be used. It should always be a little bigger than the frame so that it projects for 9 to 12 inches on every side.

A hotbed may be of any convenient depth, the point to be borne in mind being that the deeper it is the longer it will retain its heat and the greater the heat that will be generated. In general a depth of about 2 feet of trodden manure is adequate. The manure should be spread in a flat-topped heap which should be trodden firmly layer by layer. When the required depth of manure has been reached it should be covered with about 6 inches of good soil and a frame or frames placed in position on



A frame on a hotbed

top of this with the frame lights in position.

After a few days, the manure will begin to generate a lot of heat. A soil thermometer should then be inserted well down into the heap through the soil in the centre of the frame. After a few days the first fierce heat will decline and when the temperature drops to about 75 degrees, seeds may be sown in the soil or plants placed in it according to requirements. The hotbed, if properly made, should continue to generate heat for eight to ten weeks, though the heat will steadily decline. The most suitable time for making hotbeds is in early spring, as then, by the time they have lost their heat, the sun will have gained in power sufficiently to warm the frame.

If hotbeds are to be formed with straw or chaff treated with a rotting agent, instructions supplied by the manufacturer of this rotting agent, should be followed. As a rule it will be necessary to wet the straw or chaff and turn it several times after treatment, before the bed is built.

If dead leaves are mixed with fresh horse manure to make it go further, the degree of heat generated will be rather less than if fresh manure alone is used, but the heat should be maintained for an even longer period. Mild hotbeds of this kind are often very serviceable for raising seedlings and other plants which do not like a lot of heat.

HOVER FLIES See *Predators*.

HUMIDITY The amount of moisture in

the atmosphere. This is expressed as a percentage of complete saturation but it should be borne in mind that the total amount of water that can be held in the air will vary according to the temperature of the air. The hotter it is the more water it can contain. Thus 100 per cent humidity at a low temperature would represent a far lower water content than 100 per cent humidity at a high temperature. One of the reasons for recommending fairly high temperatures for certain greenhouse plants, such as cucumbers and some tropical orchids, is that this allows the high degree of humidity to be maintained which these plants require.

Plants vary greatly in their reaction to differing degrees of humidity, some thriving in a comparatively dry atmosphere and others requiring one nearly saturated with moisture. Outdoors little can be done to control humidity and plants must be chosen to suit the natural humidity of the district. Under glass a considerable degree of humidity control can be exercised by opening or shutting ventilators, by using heat to circulate air and thus make it drier, by using heat to enable the air to absorb more moisture, by spraying water freely on plants, walls and paths, or by placing shallow vessels of water in the house so that water can evaporate from them. Some insects are also much affected by humidity; red spider and thrips, for example, thrive in a dry atmosphere and die in a damp one. Humidity is calculated as a percentage of complete saturation and can be measured by instruments known as hygrometers or by calculation from the temperatures of a wet and dry bulb thermometer. See *Damping Down*, *Hygrometer* and *Ventilation*.

HUMUS This name is given to the residue left when organic matter of any kind decays. It is a somewhat loose term as it is applied both to organic matter which is only partially decayed and may still contain considerable traces of its original structure, such as leaves, plant stems, animal refuse, etc., and also to the end product of decay which will be a fine, dark brown or blackish, powdery substance

bearing no trace of its original source. Probably in a strictly scientific sense the word 'humus' should be confined to the latter product.

Humus is of immense importance in the soil because it improves its texture, giving it a spongy character which enables it to hold moisture without becoming waterlogged and also because it provides the most suitable medium for bacterial activity. It is upon the bacteria which multiply in humus that the soil depends for the breakdown into suitable plant foods of many of the complex chemicals which are contained in it. Soil which is deficient in humus will soon become infertile no matter how well it is supplied with chemicals, unless special measures are taken to ensure that these are available as plant foods and also to maintain the fertility of the medium by artificial means, as is done in those special methods of cultivation which come under the general term hydroponics or soilless culture.

In the garden humus may be applied as animal manure, leaf mould, decayed vegetable refuse, peat, spent hops, seaweed, shoddy, straw, chaff, fish waste, offal etc. Smaller, but still useful, quantities of humus are also supplied by such organic fertilizers as hoof and horn meal and bonemeal and these also have a stimulating effect on bacterial activity.

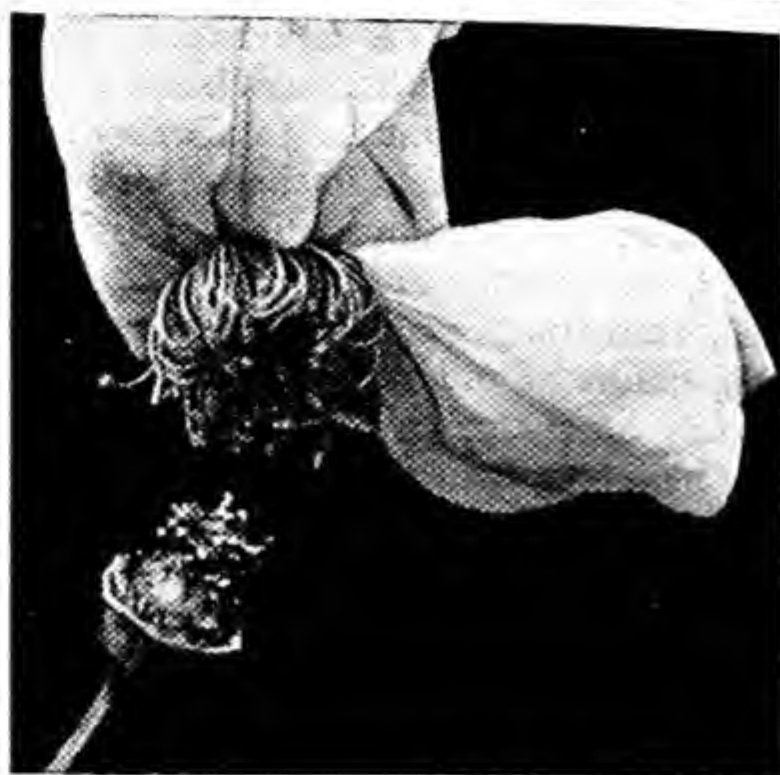
All humus is gradually destroyed in the soil by the natural processes of decay and all measures of cultivation tend to hasten this natural rate of destruction. The more thorough and more frequent the cultivation, the more rapidly will the loss of humus proceed and it is for this reason that soils which are intensively cultivated must be more heavily manured with humus-producing substances than those which are little disturbed. In a natural soil which is not cultivated, as for example, a meadow, a sufficient supply of humus is maintained by the decay of vegetation and the decaying bodies of worms and other small creatures.

HYBRID To the geneticist any plant which is not true-breeding for all its genetical factors is regarded as a hybrid. In

the garden the term is seldom used in this way, but is confined to the progeny of crosses between plants of different species or, at the very least, to crosses between plants of markedly different varieties of the same species. It will be seen that it is therefore, a somewhat ambiguous term and one which it is not easy to define accurately. For the purpose of botanical nomenclature, the term is confined to the progeny of crosses between distinct species.

Hybrid plants will as a rule, show some characteristics of both parents, though they may possibly favour one parent far more than the other. Progeny of any primary hybrid, i.e. the progeny from a cross between two species, though differing in small degree one from another, will generally show a considerable amount of similarity. Sometimes hybrid plants are themselves sterile, but when they are not their own progeny will usually show a much greater degree of variation than the original hybrid. This is due to the innumerable recombinations of genes which can occur in the second and succeeding generations. These facts are made use of by breeders, who often employ the primary hybrid when they wish to produce a plant of known character, while they may exploit succeeding generations when in search of fresh possibilities.

HYBRIDIZATION The art of making a cross between two plants with the object of producing a hybrid. For this purpose one plant will be selected as the seed, or female, parent and the other as the pollen, or male, parent. Ripe pollen is transferred from the anthers of the latter to the stigma, or stigmas of the former, this being done at a time when the flowers of the female parent are fully open and the stigma or stigmas are in a sticky and receptive condition. Frequently, though by no means invariably, the anthers of the flowers to be pollinated are removed a few days before the blooms begin to open, being forced open by hand for this purpose, the object being to prevent fertilization with their own pollen. As a further precaution the prepared flowers may be covered with greaseproof paper or cellophane bags, to prevent them being fertilized with pollen brought by insects.



Hybridization: cross-fertilizing a rose

As a result of the hand-pollination, seed may be formed and if this is so it will be hybrid seed, carrying the genetical characters of both parents. When this seed has ripened it is harvested, cleaned and stored until the most favourable sowing time. If it then germinates satisfactorily it will produce hybrid plants.

HYBRID VIGOUR The increased vigour or improved cropping capacity which is often possessed by hybrids in contrast to their parents. The reasons for hybrid vigour are somewhat obscure but its reality is well founded and has been put to practical use, for example, in the production of hybrid sweet corn which crops more reliably than ordinary sweet corn. The drawback of such methods of improving garden plants is that the increase in vigour is only fully developed in the first generation and tends to disappear in subsequent generations. In consequence the original cross must be remade each year with annual plants (or plants treated as annuals) such as sweet corn.

HYDROPONICS A name given to a particular form of soilless cultivation in which the roots of plants are allowed to grow in a tank containing a dilute solution of plant foods. The plants themselves may be supported on fine mesh wire netting stretched over the top of the tank or on glass wool or wood wool. This method of

culture, which was used in early experimental work in soilless cultivation, has been almost entirely superseded for practical purposes by aggregate culture. (See *Soilless Cultivation*.)

HYGROMETER An instrument for measuring the humidity of the air. For most purposes relative humidity is calculated, i.e. the degree of moisture is shown as a percentage of the amount of moisture that would be necessary to secure saturation at that particular temperature. As hot air will absorb more moisture than cold air, it follows that any rise in temperature will be accompanied by a fall in relative humidity unless more moisture is taken up by the air.

Hygrometers are of three main types; wet and dry bulb thermometers, hair hygrometers, and electrolytic hygrometers. When wet and dry bulb thermometers are used, a reading must be taken from both columns of mercury and then a table is employed to calculate from the difference in the two readings the relative humidity of the air. The hair type of hygrometer has the advantage that it gives a direct reading on a dial, but it suffers from the disadvantage of not being very accurate. With good instruments readings accurate to about 3 per cent can be expected. This is quite near enough for all normal purposes connected with the humidity control of glasshouses or store sheds.

The electrolytic instrument is extremely accurate and gives a direct reading like the hair hygrometer but is too expensive for ordinary garden use.

ICHNEUMON FLY, see *Predators*.

IMBRICATE Overlapping. A botanical term used to describe leaves, bud scales, etc. which overlap one another like the tiles on a roof.

IMMUNE Plants are sometimes described as being immune to this or that pest or disease, meaning that they are, by some peculiarity of their nature, protected from it. The term is frequently applied to certain varieties of potato, but in a re-

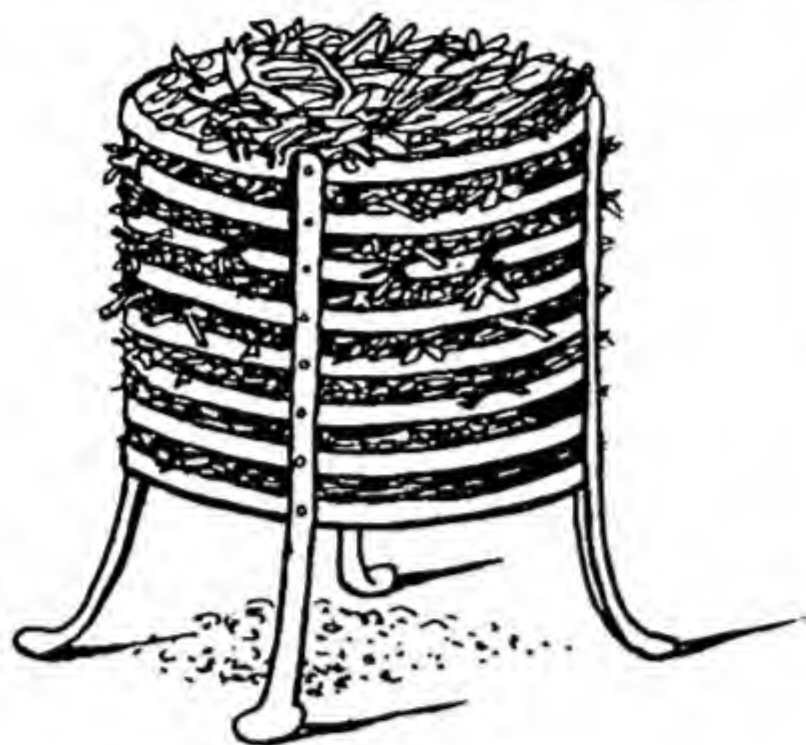


Imbricate

stricted sense, for a potato which has the word immune before or after its name is one which is immune to the wart disease of potatoes but not necessarily to any other disease. In districts in which wart disease is prevalent, only immune varieties of potato should be planted. The word is also sometimes used in connexion with strawberries, usually to designate those varieties which are not affected by virus disease. However, the strawberry plants are not really immune to virus attack, i.e. incapable of carrying the infection at all, but rather can become infected by virus without showing any adverse symptoms. Such plants can become dangerous carriers of the disease, passing it on to others though they show no signs of infection themselves. Tolerant is a more accurate word than immune in this instance.

INARCHING, see *Grafting*.

INCINERATOR Any apparatus designed for the efficient burning of rubbish. A well-made incinerator can be of great value in the garden though it should only be used for materials which are either too diseased or too woody to be placed with safety on the compost heap. Burning inevitably



A garden incinerator

destroys all the organic matter in garden refuse and also much of its value as plant food, though wood ash contains an appreciable quantity of valuable potash.

A useful incinerator can be made from an old oil drum or similar container with the top removed and a number of holes punched in the bottom and sides. If this is placed on three or four bricks so that there is a free passage of air beneath it, a great deal of rubbish can be burned in it without difficulty.

Another useful type of incinerator can be made with loose bricks built in the form of a circle or rectangle with a small space left between each pair of bricks. A grid of iron bars should be placed inside this brick 'box' a few inches above ground level, supported on some more bricks or in any other convenient way. Such loose-brick incinerators can be of any convenient size, one suitable for a small garden being 3 feet in every direction.

In addition there are numerous manufactured incinerators on the market, many of which are extremely efficient.

INCISED Cut or slashed. A botanical term usually applied to leaves which have rather deeply cut margins.

INDUMENTUM A dense covering of short hairs. A botanical term used to describe leaves or stems which have a covering of this character. In gardens it is

frequently used in the description of certain species of rhododendron.

INFLORESCENCE The flowering part of a plant which may be composed of one or more flowers arranged in many different ways. See *Panicle*, *Raceme*, *Head*, etc.

INFORMAL The opposite of formal—usually applied in gardening to those types of design in which an attempt is made to follow nature fairly closely and to avoid set lines and geometrical designs. Wild gardens and rock gardens are two typical examples of informal garden design.

INORGANIC The opposite of organic; in the strict interpretation any chemical compound not containing carbon. Inorganic chemicals such as sulphate of ammonia, nitrate of soda, sulphate of potash, muriate of potash, sulphate of magnesium, etc., play an important part in the feeding of garden plants and these or similar substances must frequently be used to maintain fertility of the soil. Inorganic chemicals do not enrich the soil in humus and as a rule do little or nothing to improve its texture—in fact they sometimes harm the texture of the soil. In consequence they have sometimes been condemned, but this should not be so, as, if properly used, they do no harm and a great deal of good. Inorganic forms of nitrogen are, in general, cheaper than organic forms and several of them, such as sulphate of ammonia and nitrate of soda, are a good deal quicker in action than any organic source. Provided humus in sufficient quantity is applied in other forms (see *Humus*), correct feeding of the soil with inorganic foods can do nothing but good.

INSECT Strictly speaking this term applies only to a particular section of the animal kingdom, all members of which have six legs, and bodies composed of three distinct sections—a head, thorax and abdomen, as in butterflies, moths, bees, wasps, beetles and flies. Insects usually have a life cycle consisting of four distinct stages: first the egg, then the larva (popularly known as a grub, maggot or caterpillar), then the pupa or chrysalis and then finally

the perfect insect or imago which can be a bug, beetle, fly, etc. The term insect, is often loosely used in the garden for a great many small creatures which are not true insects at all, e.g. spiders, centipedes, woodlice and even worms.

INSECTICIDE Any substance which will destroy insects. Broadly speaking, insecticides can be classified as liquids, powders, smokes and vapours, though very often the same chemical can be produced in all four forms. Insecticides are also classified as stomach poisons and contact poisons; again some substances have both properties. Stomach poisons must be eaten by the insects or other small creatures before they are effective in destroying them, whereas contact poisons have only to be brought into contact with the body of the insect to have their effect. Both types are of importance to the gardener, the stomach poison because it enables him either to prepare poisoned baits which are placed here and there for the insects to devour, or to use the plants themselves as baits, coating them with a thin film of the stomach poison so that the insect is poisoned by the first few bites it takes. Contact poisons provide an important means of destroying those insects which do not actually devour leaves or stems, but suck the juices from them by puncturing them with a proboscis or similar organ. Greenflies and other aphides are of this type and cannot be destroyed with stomach poisons unless these can be introduced to the sap of the plant (see *Systemic*). It should be noted, that whereas a plant can be protected in advance of an attack by the use of stomach poisons, it is not usually possible to take such preventive measures with a contact poison. Generally this must be applied at the first sign of attack, the spray, dust, smoke or vapour being applied in such a way that the insect is covered with poison. In a few instances however, it has been found possible to coat plants in advance with a poison which will act by contact through the feet or body. DDT is of this nature.

Among the many insecticides used in the garden are azobenzene, arsenate of lead, benzene hexachloride (Lindane), cal-

cium cyanide, calomel, carbon disulphide, cresylic acid, DDT, derris, dinitro-ortho-cresol, formaldehyde, hellebore, HETP, mercuric chloride, metaldehyde, naphthalene, nicotine, paradichlorobenzene, Paris green, petroleum oil, pyrethrum, sodium fluoride, tar oil, TEPP, tetrachlorethane and thio-cyanate. These will be found under their respective names.

Insecticides may be prepared as liquids or as solids which can be dissolved in water, the purpose in both cases being to apply them in the form of sprays; or they may be in the form of dusts, usually containing quite a small proportion of the active ingredient, the remainder being an inactive carrying agent, the intention being that these shall be applied dry as purchased; or they may be combined with a pyrotechnic material so that, when ignited, smoke carries minute particles of the insecticide to any plants with which it comes in contact; or as liquids or solids which can be vaporized so that the vapour itself kills the insects; or for discharge as aerosols or suspensions of extremely fine particles in air. Smokes, vapours (or fumigants) and aerosols are primarily intended for use under glass, whereas sprays and dusts can be used anywhere. In the open, sprays appear to be rather more efficient, on the whole, than dusts, but dusts may well prove more economical to use, especially if water is not readily available.

INSECTIVOROUS Literally, insect eating. In gardens the term is applied to plants which catch and destroy insects though it is not certain that all plants so described actually use the insects as food. Some plants have extremely ingenious devices for trapping insects, e.g. in the pitcher plants (*Nepenthes*) some of the leaves are modified to form pitcher-like structures with a frill of down-pointing bristles round the inside of the mouth, rather in the manner of a lobster pot. The pitcher itself contains a small quantity of fluid which is attractive to insects. These enter the pitcher by the mouth but are unable to crawl out again because of the down-pointing bristles. In the Sundew (*Drosera*) and Venus's Fly Trap (*Dionaea muscipula*) the leaves actually

have the power of movement, being stimulated by a touch to fold inwards and grasp any object which may be lying on them.



The pitcher plant, a typical insectivorous plant

INSECTS FRIENDLY, *see* *Predators.*

INTERCROP The practice of growing one crop between the rows of another crop, e.g. radishes are sometimes sown between rows of peas, or lettuces between rows of onions.

INTERNODE That portion of the stem of any plant situated between two joints or nodes.

INVOLUCRE The whorl of bracts which is to be found close beneath some flowers or flower clusters. An involucre is a prominent feature of all flowers of the daisy type.

IRISHMAN'S CUTTING A name occasionally given humorously to 'cuttings' removed from the parent plant with some roots attached. Strictly speaking such pieces are not cuttings at all but small divisions.

IRRIGATION The artificial application of water to land usually for the purpose of

stimulating the growth of plants and so increasing the weight or quality of plants produced. In a really dry country irrigation can be an indispensable preliminary to any cultivation. In this country our comparatively heavy rainfall somewhat obscures the value of irrigation. Nevertheless it has been proved time and again that droughts do occur sufficiently frequently and intensely to make irrigation a paying proposition, at any rate so far as the more valuable vegetable crops are concerned, e.g. lettuces, spring onions, early carrots, french beans and ridge cucumbers.

The most primitive form of irrigation usually consists in cutting channels across the ground and flooding these with water. This gives fairly good results but greater efficiency can be obtained by applying water overhead in the form of a fairly fine spray. A great deal of ingenious apparatus has been developed to spray water efficiently in this way. A simple and well-known type is the revolving lawn sprinkler in which two or three fine jets, mounted horizontally on a rotating axis, drive themselves round by the reflex force of the water passing through the jets. A more elaborate method is to direct a jet of water on to a cogged wheel which not only splits the jet up into a number of fine drops, but is also driven round by the jet, so gradually turning the whole apparatus. Yet another development suitable for larger installations is



Involucre

the line irrigator, consisting of a series of pipes, carrying small jets along their length and delivering a spray over a wide area. These line irrigators may themselves be connected to an oscillator driven by the water pressure and turning the line of pipes first one way and then the other, so giving wider and more even coverage with the water spray. The ideal irrigation plant should deliver water at a rate at which it can be easily absorbed by the soil without forming puddles on the surface.

A further development has been the introduction of irrigation apparatus which is capable of adding carefully graded quantities of fertilizer to the water so that the crops are fed at the same time as they are watered.

JOINT Where applied to plants, this term is synonymous with node and indicates the point of junction between a leaf or leaf stalk and a stem. A plant is said to be short-jointed when joints occur very frequently along the stems, the spaces between them being small. By contrast a long-jointed plant is one in which the joints are comparatively few in number and widely spaced. Plants tend to become abnormally long-jointed when deprived of light or grown in too much heat.

JUNE DROP At about the time that apples and pears are forming their seeds usually in the latter half of June, there is often a heavy natural fall of the partly formed fruits. For this reason final thinning is usually deferred until the June drop is complete.

JUVENILE Some conifers produce two quite distinct types of growth—one in the seedling state and while the plant is still young and another which gradually replaces it as the shrub or tree becomes mature. This distinctive type of early growth is frequently referred to as juvenile growth, in contrast to the later type which is referred to as 'adult'.

KAINIT A natural deposit which occurs in some parts of the world, notably in France and Germany and which consists largely of potash combined with common

salt and Epsom salt. At one time it was largely used as a potassic fertilizer in gardens, but its place has been taken in a large measure by sulphate of potash and muriate of potash which have the merit of containing a considerably higher and constant percentage of potash, whereas in kainit the proportion of potash may vary from one sample to another. Moreover the impurities in kainit, particularly the common salt, can sometimes cause serious damage to plants. Nevertheless kainit is still used, principally as an autumn or winter dressing, in orchards. The rate varies from 2 to 4 ounces per square yard. An average sample of kainit will contain approximately 14 per cent of potash in the form of sulphate, 60 per cent common salt and 20 per cent sulphate of magnesium (Epsom salt).

KEEL The boat-shaped part of a leguminous flower such as a pea or lupin. The rest of the flower is composed of an erect petal, the standard, and two lateral petals, the wings.

KELP The ashes produced as the result of burning seaweed. Kelp itself is seldom used as a garden fertilizer though it does contain considerable quantities of potash. The name, however, is often applied to seaweed itself, which is a valuable and much-used manure. (See *Seaweed*.)

KRILIUM, see *Soil Conditioner*.

LABELLUM The lip of a flower. A term



The labellum or lip of an orchid

frequently used in the description of the flowers of orchids.

LACEWING FLY, see *Predators*.

LACINIATE Cut into narrow segments. A botanical term usually applied to leaves that are lobed in this fashion.

LADYBIRD, see *Predators*.

LANCEOLATE A botanical term meaning lance-shaped and usually applied to leaves which are considerably longer than they are wide and taper at both ends.



A lanceolate leaf

LANDSCAPE GARDENING Strictly the art of laying out ornamental grounds so that they blend with the surrounding landscape. The great exponents of this art were Repton and 'Capability' Brown at the end of the eighteenth century. The term has also been loosely applied to all forms of garden design and construction. Landscape architect is similarly applied to almost any garden designer whether he is, in fact, working on large schemes carried out on natural, or pseudo-natural lines, or engaged in the planning of small gardens without particular reference to their environment.

LARVA The caterpillar, grub or maggot stage of an insect's life. It is one of the four stages in the usual life-cycle and follows the egg. When fully grown the larva turns into a pupa or chrysalis.

LATENT The term is sometimes applied to buds which have failed to grow but the term 'dormant' is in more common use in gardens.

LATERAL A side shoot or branch in contrast to a leading or terminal shoot found at the end of a branch. The term is

frequently used in connexion with the training and pruning of fruit trees.

LATTICE Another name for a trellis of wood, iron or any other material. Lattice-work is frequently used as a support for climbing plants and it may often be usefully employed to raise the height of a fence or wall without too drastic a reduction of light.

LAWN Any area of turf which is kept closely mown. Lawns are usually formed of grass but occasionally other herbage is used and at one time considerable interest was taken in the formation of chamomile lawns, which have the merit of withstanding drought better than grass lawns.

Ordinary grass lawns may be formed from seed, from imported turf, or from the natural turf of the site. If seed is used, it is usual to prepare the site by thorough digging, followed by a period for weathering. The surface soil is then broken down finely with rake or Canterbury hoe, and made firm but left with a crumbly surface.

Seed of selected grasses is sown, spring and early autumn being the two most favoured seasons for this work. The rate of sowing may vary from $\frac{1}{2}$ ounce to 2 ounces per square yard and the seed itself may be of one of the finer grasses such as sheep's fescue, New Zealand bent or brown top, or of coarser grasses such as rye grass and meadow grass, or of any favoured mixture of all or some of these grasses.

It should be noted that the finer grasses in general take longer to germinate than those of coarser nature and being less vigorous in their early growth, are less able to compete with weeds. In consequence if it is desired to form a lawn of fine grasses it is desirable to take special pains to eliminate weeds before sowing, and this may be done by preparing the ground in spring or early summer and allowing it to lie fallow until the time for autumn sowing. During the intervening months successive crops of weeds will grow and should be destroyed at once by hoeing or other suitable cultivation.

Seedling grass should not be cut until it is at least 3 inches high and then only with

a very sharp lawn mower set rather high, or with a sharp scythe. Frequent and close mowing should only be commenced when the grass is well established, which is likely to take several months, though the time will vary according to the season and weather and soil conditions.

Lawns from turf are usually made in autumn or early spring, though using this there is considerably more latitude than where seed is employed. The turf itself should be of good quality, containing a high proportion of finer grasses and being reasonably free from weeds. It is usually cut by contractors in 3-foot by 1-foot rectangles which are then rolled up for easy transport. This is satisfactory for ordinary purposes but where very true lawns are required, as for a tennis court, bowling green or putting green, it is desirable to cut the turf in one foot squares and not roll them up. Whichever size of turf is used, it should be laid in straight rows on a perfectly even surface of finely broken soil, alternate rows being staggered so that the joints between the turves only meet in one direction. This helps the turves to knit together and so remain undisturbed while they are rooting into the foundation soil. The turves are usually settled in position by beating them gently but firmly with a special wooden turf beater or the back of a spade. Alternatively they can be rolled with a light roller.

Bowling greens, and some other lawns in which a very fine and true surface is required, are often made with what is termed sea-washed turf or Cumberland turf, because much of it comes from Cumberland. This is a particularly fine turf found in certain coastal districts and it owes its fineness to the fact that it is washed by salt water at high tides. Unfortunately such turf often proves troublesome in inland districts, dying out in patches after a few years no matter how carefully it is tended.

Mowing of lawns that are newly established should never be done more severely than necessary for the purpose for which the lawn is required. Sports greens will usually need to be mown more closely than those only required as a setting for plants. The very close shaving of lawns which is

sometimes seen should be avoided whenever possible as it tends to weaken and even kill the grass.

Lawn grass, like any other herbage, requires feeding if it is to be maintained in good condition. For this purpose fertilizers containing a high percentage of nitrogen are usually employed, as these tend to encourage the finer grasses, whereas fertilizers containing phosphates may encourage the coarser grasses and clovers. Nevertheless purely nitrogenous feeding is not desirable and though simple chemicals such as sulphate of ammonia may sometimes be used with advantage to stimulate grass and discourage weeds, they should never be relied upon exclusively. For general feeding a balanced fertilizer containing nitrogen, phosphoric acid and potash should be used and most manufacturers of compound fertilizers prepare suitable mixtures, see also *Turf*, *Turf Beater*.



Sowing grass seed in yard squares

LAYER Layering is the name given to a particular method of propagation in which a shoot or stem is induced to form roots while still attached to the parent plant, after which it is severed and replanted to form a new plant. A layer is a shoot or stem so treated, and the name is applied equally to the shoot at the time at which it is selected and prepared, and to the same shoot when it has formed roots and been detached.

Layering is the usual method of propa-

gation for border carnations and is also applied to many shrubs and some trees and climbing plants, including rhododendrons, magnolias, quinces and clematis. It is, in general, a somewhat slower method of increase than propagation by cuttings, but it has the merit of being considerably more foolproof, as the layer is supported by the parent plant until it has formed roots. A special form of layering is used in the propagation of such fruit stocks as the Paradise apple and quince.

There are two essentials in successful layering. First the stem must be placed in close contact with the soil or better still, lightly buried in it. Secondly the flow of sap at the point of contact between stem and soil must be checked. This may be done either by slitting the stem or branch or by twisting or bending it sharply. With border carnations the former method is usually adopted, a knife being inserted just below a joint which can be brought into contact with the soil, and then drawn up through the stem so as to form a tongue through the joint. A similar method is often employed with shrubs; an alternative is to remove a ring of bark about $\frac{1}{4}$ inch wide, just below a joint which can be buried in the soil. Often, however, the incision is dispensed with and instead the stem is given a sharp twist and upward bend at the point of contact with the soil, so rupturing some of the tissues. This method is commonly used when rhododendrons are increased by layering.

In all these instances the layer must be held down in the soil by some means. Frequently, forked wooden pegs are employed, driven firmly into the ground with one arm of the fork over the layered shoot. For small plants, such as border carnations, wire layering pins are frequently used, shaped rather like large hairpins and used in the same manner as the wooden pegs, just described. Occasionally a large stone may be employed to hold a branch down.

If the natural soil round the plant is very close in texture it is wise to remove some of it where the layer will touch, and replace with a specially prepared mixture containing plenty of sand and peat or leaf mould. The preparation of a gritty com-



Layering carnations: slitting a stem

post, but in this instance devoid of peat or leaf-mould, is particularly important with border carnations, and as in this instance the layers must root fairly rapidly if they are to be successful, the soil should be kept well watered if the weather is dry.

With fruit stocks, such as Paradise apples and quince, the method commonly employed is to behead well-established plants in late winter, cutting them back to within a few inches of soil level. As a result numerous young shoots will be thrown up from the stumps. As these grow, soil is drawn up round them. No attempt is made to cut or bend the stems, as it is found that roots are formed readily into the mounded soil without any artificial stimulus.

For all layering it is preferable to rely on fairly young growths—current year's non-flowering shoots with the border carnations, and usually one-year-old stems for shrubs, trees and climbers. Older stems or branches can sometimes be treated successfully, but in general they are slower in making roots. The best time for layering trees, shrubs and climbers is usually in late spring, but work can be done at almost any time of the year. With plants of this type, roots are usually formed rather slowly, and it may be eighteen months before the layers are able to support themselves in separation from the parent. With soft-wooded plants such as border carnations, rooting is much more rapid. Border carnation layers are usually pegged down in July and, if all goes well, should be rooted and ready for transplanting in September or at latest early October.

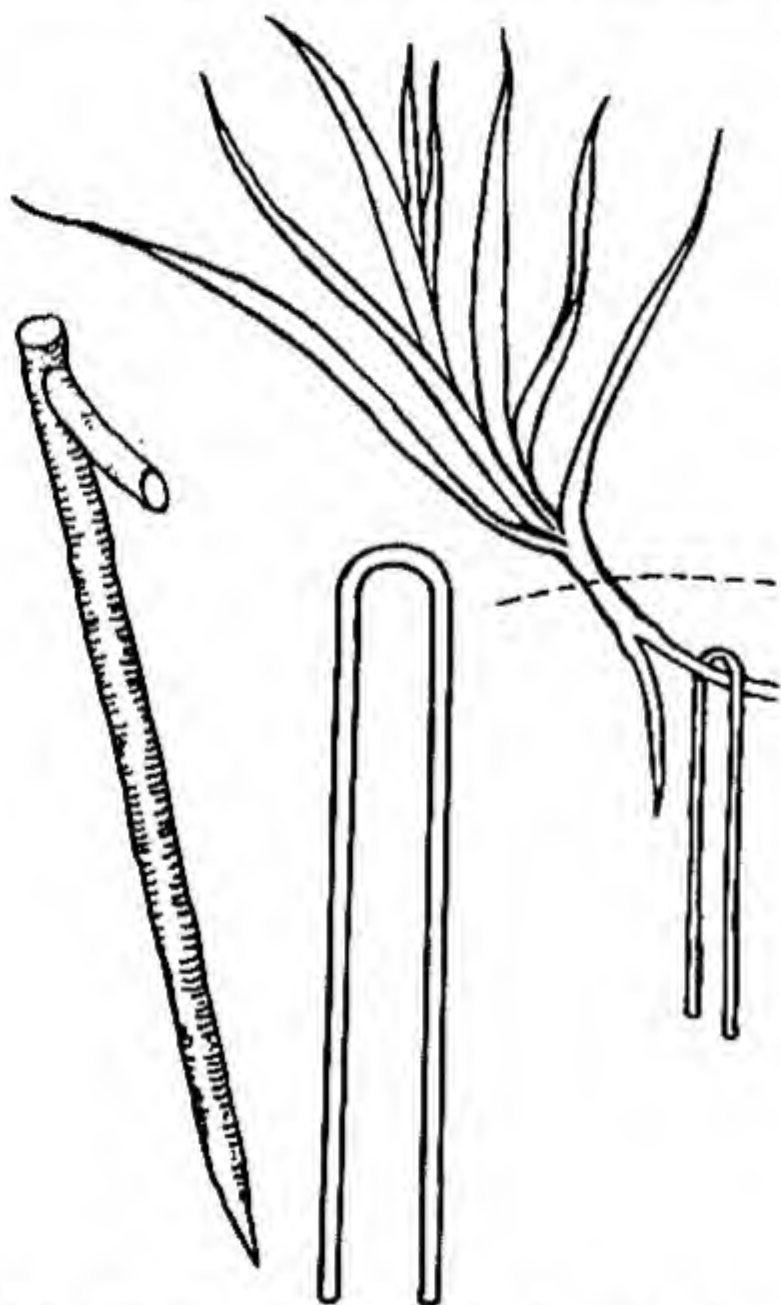
It is usually wise to sever the layers a short time before they are actually dug up and removed, as this lessens the shock of transplanting.

In a few instances it may be necessary to layer a shoot which cannot actually be bent down to soil level. This can be done by placing a pot or box filled with soil alongside the stem and layering it into this. The soil in this pot or box will have to be watered and must never be allowed to become dry. A further modification of this scheme applicable to very stiff stems which cannot be bent at all, is to split a box or pot into two halves which can then be fitted together round the stem and bound in position with wire. The container so formed is then filled with soil and the layering continues in the ordinary way. This method, often referred to as Chinese layering or air layering, is sometimes used to reduce the height of 'leggy' specimens of *Dracaena* or indiarubber plant (*Ficus*), the stem being layered just below the tuft of

leaves at the top. When rooted the layer forms a new plant and the old leggy specimen below the point of layering can be discarded. A further development relies on the properties of certain plastic (polythene) films through which air can pass but which are impervious to moisture. If a stem is wounded, either by ringing or slitting, and damp sphagnum moss is placed round the wounded area and sealed with this plastic film, the moss will remain moist for months and roots may be formed into it, after which the rooted stem can be removed and planted. The film is wrapped closely round the moss and sealed at each end with insulation tape.

LEACH A term used to describe the removal of soluble plant foods from a soil by water draining through it. In areas of heavy rainfall the loss of plant foods by this means may be considerable, especially of some of the very soluble nitrogenous salts. The winter leaching of such useful chemicals can sometimes be prevented by growing a green manure crop in the late summer and digging it in during the autumn. By this means the plant foods are locked up temporarily in the green manure crop. By the time they have been liberated by decay the winter is over and more crops are ready to make use of them.

LEAD ARSENATE A powerful arsenical poison which is of great use in the destruction of caterpillars, weevils and many other pests. Lead arsenate is a stomach poison (see page 133) and has the drawback of being poisonous to warm-blooded animals, including human beings, as well as to insects. Moreover it remains a long time on the plant and is a cumulative poison, i.e. small doses are retained and, if added to, may build up until they reach dangerous proportions. Nevertheless, lead arsenate is still the most effective insecticide for certain purposes and continues to be used in very large quantities. The method of application is to spray it on the plant to be protected directly an attack is observed, or, better still, a short while before such an attack is expected. A thin film of the poison will then remain on leaves, stems and fruits,



Layering carnations: methods of pegging down

ready to poison the insect after the first few bites. The usual rate of application is $\frac{1}{2}$ pound of lead arsenate paste or $\frac{1}{4}$ pound lead arsenate powder to 10 gallons of water. Lead arsenate can be mixed with most of the fungicides in common use, including lime sulphur and Bordeaux mixture and it can also be mixed with nicotine, but it should not be used in any spray containing soft soap.

LEADER The shoot which terminates a branch and which, if left, will continue to extend it in the same general line of growth. The term can also be applied to a side growth or lateral from which it is intended to build up a main branch by allowing it to extend. A replacement leader is a side growth so treated, with the intention of eventually cutting out the main branch beyond the point at which it is growing and allowing it to replace that branch.

LEAF BLISTER MITE An insect pest of pears which also occasionally attacks plums. The insects themselves are mites of such small size that they can only be seen with a very powerful lens. These mites enter the leaves and cause them to develop yellowish-green blisters. During the winter the mites live under the bud scales. The best method of control is to spray with a petroleum emulsion winter wash in March, just before the bud opens. Badly blistered leaves should be gathered when seen and burned.

LEAF CURL A disease of peaches, nectarines and almonds. It is caused by a fungus which attacks the young leaves, causing them first to turn yellowish and then very quickly to develop dark red patches which become thickened and distorted. The fungus may also attack twigs, which die back in consequence. Growth is weakened and in severe cases young trees may be killed outright. All infected leaves should be picked off and burned and twigs that are dying back should be removed and burned when pruning. Trees may be sprayed with Bordeaux mixture at the end of February or early in March just before the buds begin to swell.

LEAF HOPPER Two distinct genera of small insects not unlike the aphides (greenfly) or capsid bugs, pass under this popular name. Adult insects are pale yellow and have wings whereas the larvae, though of similar colour, have no wings. The larvae suck sap from the leaves in the same way as greenflies or capsid bugs, but produce a characteristic white mottling quite distinct from the damage done by these other pests. Leaf hoppers often leave papery white cast-off skins on the undersides of the leaves and these in conjunction with the white mottling, provide a method of diagnosis even when the insects themselves cannot be found. Many kinds of plants are attacked, particularly under glass. Outdoors, roses are particularly subject to attack by one particular kind of leaf hopper. The remedy, both indoors and out, is to spray with either nicotine or HETP. Alternatively, under glass, fumigation with nicotine may be carried out.

LEAF MINER A general name given to the larvae of various kinds of fly all of which feed by tunnelling their way through the tissues of leaves without actually coming to the surface. In chrysanthemums, marguerites and cinerarias, snaky white lines are produced as a result of this tunnelling.



Peach leaf curl attacking leaves and fruit

In celery, lilacs and holly, blister-like patches appear. The presence of the larvae within the leaf can always be felt if the leaf is drawn between finger and thumb, and the larvae can usually be seen if the leaf is held up to a bright light. In mild attacks a sufficient control can be effected by stabbing the larvae within the leaf, using a pen-knife or pin for this purpose. In more severe cases badly attacked leaves should be removed and burned and the plants sprayed occasionally with a nicotine insecticide.



Leaf miner and damage caused by larvae

LEAF MOULD A term which has two distinct applications in the garden. It is used for the dark brown powdery or flaky substance which results when leaves have been stacked and allowed to rot for a sufficiently long time. As a rule leaves swept up and stacked one autumn will be converted into good leaf mould by the normal processes of decay by the following autumn. Decay will go on more rapidly in warm, rather damp conditions than in dry, cold ones. In good leaf mould it should not be possible to find whole leaves or even frag-

ments of leaves recognizable as such, but only small flakes.

Leaf mould is a valuable source of humus and was at one time the main source of this in potting composts. It has been largely displaced by peat, partly because peat is free from weed seeds and the spores which spread disease, and partly because it decays more slowly and therefore retains its nature for a longer time in the compost than does leaf mould. Nevertheless, leaf mould is still preferred for some purposes.

The best forms of leaf mould for composts are those obtained from beech or oak leaves. Any leaf mould may be used in the open garden either as a top-dressing to smother weeds and provide a mulch, or forked or dug into the soil as a substitute for manure. Leaf mould is not as rich in plant foods as the best animal manures, such as those from horse, cow or pig, but it does contain some plant food and has a most important physical effect upon the soil and micro-organisms in it.

The usual rate of dressing for leaf mould is a barrowload to 6 to 10 square yards and in potting composts it will usually compose about one-third to one-fifth of the whole bulk.

Leaf mould is also used by gardeners as the name for a disease of tomatoes which attacks the leaves and causes them to develop spots or patches which are light in colour on the upper surface of the leaf and covered with a khaki felt on the lower surface. At first the leaves have a distinct mottled appearance but later they may wither completely. The disease is caused by a fungus which thrives under close and stuffy conditions. It is only likely to prove troublesome under glass. Preventives are to give plants plenty of space and to ventilate freely. If the disease appears despite precautions, plants should be sprayed with colloidal sulphur, or Bordeaux mixture, or dusted with flowers of sulphur. Some varieties of tomato are resistant to certain forms of this disease and these may be tried where the disease has proved troublesome. Veto-mold is one of the best known of these varieties.

LEAF SCORCH A physiological dis-

order which may affect many different kinds of plant but is particularly troublesome on apples and gooseberries. The characteristic symptom is browning and withering of the margin of each leaf. In severe attacks the whole leaf may eventually be affected or leaves may fall prematurely. With gooseberries the leaf margins assume an ashen grey colour which is very distinctive.

Leaf scorch is due to lack of potash and may be aggravated by the excessive use of nitrogenous fertilizers. The remedy is to give ample potash fertilizer which may be applied annually in autumn or spring in the form of sulphate or muriate of potash, at rates from $\frac{1}{2}$ to 2 ounces per square yard according to requirements. Leaf scorch is liable to be most severe on soils that are badly drained. Under glass it is aggravated by too dry an atmosphere and too much exposure to strong sunlight.



Leaf scorch on a geranium leaf

LEAF SPOT A general name given to many unrelated fungal diseases which produce more or less circular spots on the leaves of plants. Carnations and pinks are attacked by one kind of leaf spot in which the spots have a bleached appearance and the leaves eventually become pale yellow and curl lengthwise. Celery is attacked by a different kind of leaf spot. In this instance the spots are brown with minute black dots

on them. Another fungus causes reddish spotting on strawberry leaves.

Badly affected leaves should always be



Leaf spot on a strawberry leaf

removed and burned. Carnations and pinks can be dusted frequently with flowers of sulphur. Celery and strawberries may be sprayed occasionally with Bordeaux mixture—from August to October for celery and from April to the end of May for strawberries. Celery leaf spot is carried on the seeds and in consequence sterilization of the seeds may be desirable. This is affected by soaking the seeds for three hours in a solution of formalin, 1 teaspoonful to $\frac{1}{2}$ gallon of water.

LEATHER JACKETS The larvae of several species of crane fly or 'daddy-long-legs'. Superficially these larvae look a little like dark grey or blackish caterpillars, but closer examination will reveal that they have no legs. They have very tough skins, hence the name 'leather jackets'. These larvae feed on grass roots and many other roots and are capable of causing a great deal of damage. On lawns they may kill the grass in small patches while in a herbaceous border or vegetable garden they are capable of checking or killing many kinds of plant. Damage from leather jackets is

most likely to be severe on ground that has recently been broken up from pasture.

Leather jackets can be poisoned with Paris green and bran (4 ounces Paris green and 7 pounds of bran, made slightly moist and mixed to a crumbly mash). This should be placed here and there on the surface of the ground where the larvae are known to be. Finely powdered naphthalene dug or hoed in at 2 ounces per square yard is of some value. A more effective treatment is to fork in a soil insecticide containing gamma-BHC. Lawns may be cleared by watering them very heavily towards evening and then covering at night with wet sacks, tarpaulins or boards. This will exclude air and the leather jackets will come to the surface to breathe. If the covering is removed in the morning the leather jackets can be swept up. Potting soil which is believed to contain leather jackets should be sterilized.



Leather jackets, or crane fly larvae

LEGUME Strictly speaking a botanical term used to describe the particular type of seed-pod found in members of the pea family, but gardeners use the term more broadly to cover all plants of this family so that 'grow legumes' means 'grow some member of the pea family'.

LEPIDATE Covered with small, scurf-like scales. A botanical term used to describe the scale-like covering of some leaves and stems. In gardens it is most likely to be used in the description of certain species of

rhododendron in contrast to those which have a hairy covering or indumentum.

LEVELLING Much of the levelling of ground necessary in gardening can be done solely by eye, but where accuracy is essential, as in the formation of tennis courts or bowling greens, use must be made of a spirit level and boning rods. The latter are stakes each with a horizontal cross piece nailed at the top, rather like an elongated letter T. If several of these rods are driven into the soil in a row, it is possible to sight across them and obtain a true level or, if it is so desired, an even slope. Boning rods will only be needed when there is a great deal of variation in the existing levels of the ground and even then they will usually only be used to give a rough level, the final work being checked up with spirit levels. Where the variation in levels is only slight, the work can be done with spirit levels only.

When working with boning rods, start at the lowest point of the ground and drive in one of the rods so that the cross member is at approximately eye level. Now drive in a second boning rod a few feet away in the direction of the highest ground. Place a straight-edged plank across the tops of these two posts and check for a true level with a spirit level. The second post can be driven in further or pulled out a little until a true level is obtained. Now drive in a third post at the topmost point of the slope in the line indicated by the first two. Sight across the first and second posts from time to time until the top of the third post is exactly in line with them. If the rise is very steep it may be necessary to open a trench between posts two and three in order to get a true level. If the ground rises in other directions, sights should be taken across these in exactly the same way, starting from the most convenient point along the first line. The first post in this new line will itself be levelled by sighting across any two posts in the first line. When all the boning rods required have been driven in, the differences in level between one part of the ground and another, will be revealed, and a decision can be made whether to remove all the soil to the lowest level; to add more soil to build it all up to the

highest level; or to strike some mean between these two extremes. In any case the exact point to which the soil should be brought can be marked on the boning rods, by measuring downwards from the top of the cross member an equal distance in each case.

When the soil has been roughly levelled to these marks on the boning rods, the final levelling should be done with pegs, planks and spirit level. The method here is to drive in a number of short pegs all over the ground and a few feet apart. As it will be necessary to place a straight-edged plank between each pair of posts, the exact distance apart for these pegs can be determined by the length of the plank that is to be used. Now starting from the post which seems to be at approximately the mean level, work on from post to post, first in one direction and then in another, using a mallet, the straight-edged plank and the spirit level to bring each post to a dead level with post number one. The process is in fact very similar to that used with the boning rods except that all the levelling is done with the spirit level and not by eye. When all the posts have been driven in to the correct degree, the soil should be levelled so that it is just flush with the top of each.

It is usually important when levelling the ground, to keep the top soil on top. If this is not done and instead much of the lower soil is exposed, this may prove to be relatively infertile. To avoid this danger it may be necessary to skim off all the top soil first to a depth of about 10 inches and place it to one side. After this the lower soil is levelled and finally the top soil is returned as an even top-dressing all over the site. It is sometimes more convenient and less laborious to work in small sections, removing the top soil from one part at a time, levelling the lower soil, returning the top soil and then passing on to the next section.

LIFTING This term is applied equally to the digging up of trees, shrubs and other plants that are to be moved from one place to another, and to the digging of potatoes and other root crops for use for storing. When any plants are lifted as much care as

possible should be taken not to damage the roots unduly. In the case of fairly large specimens of trees and shrubs this may necessitate a fairly extensive excavation. Certainly it can be expected that there will be many strong roots extending at least as far as the branch spread. Sometimes a tripod and tackle is used to lift such large specimens after they have been suitably undermined, and a low truck or trolley is then employed to transport them to their new site with as little disturbance as may be of whatever soil may remain clinging to the roots.

The best season for lifting deciduous trees and shrubs is usually the late autumn, though work can generally be continued during any fairly mild weather from mid-October to early April. This season is also suitable for most conifers, but broad-leaved evergreens usually lift more safely a little earlier in the autumn or late in the spring, early October and late April often proving particularly favourable times.

Herbaceous plants are usually lifted in March, April, September and October, but some have marked preferences for one season rather than another and some can be transplanted very successfully at other times, even in some instances, in mid-summer.

Bulbs are usually most safely lifted as soon as their foliage dies down and they commence their normal resting period. Some bulbs benefit from fairly regular lifting each year and this is usually so with tulips and hyacinths, but others are much better left undisturbed until they become so overcrowded that there is a falling off in the number of flowers produced, and this is true of narcissi and crocuses.

The lifting of vegetable root crops is usually carried out in late summer or early autumn when they have completed their growth. Care should be taken to lift these crops without injury to roots or tubers, as bruises, cuts, etc. may cause premature decay in store. Some varieties of potato, such as Arran Banner, are particularly difficult to lift without some damage as they produce their tubers on long stolons well away from the centre of the plant. A fork should be used for all potato lifting

and this should be thrust in well away from the plant and a good volume of soil lifted and then turned over and spread out with one movement so that all the tubers are exposed on the surface.



Lifting a herbaceous plant

LIGHT This is essential for the healthy growth of all green plants which use the energy of sunlight to convert simple chemicals containing carbon, oxygen, hydrogen, nitrogen etc., into complex carbohydrates and proteins. Light also has a second profound effect upon many plants by controlling the way in which their energies are directed either to the production of growth or of flowers. For a fuller account of this see *Photoperiodism*. Artificial light is frequently used in greenhouses, either to supplement sunlight in the manufacture of plant foods or to control flower bud formation. Much greater illumination is required for the first purpose than for the second. Fluorescent and mercury vapour lamps are the types most commonly used and in many installations lights are arranged so that they can be brought close to the plants when in use and removed when not required so that they do not impede daylight.

LILY DISEASE A name sometimes given to fungal diseases caused by a species of botrytis which principally attacks the Madonna lily (*Lilium candidum*) and nearly allied Nankeen lily (*Lilium testaceum*). Brownish spots appear on the leaves, which later wither from the bottom of the plant upwards. The disease is likely to be most

severe in late spring and early summer. Badly infected plants should be burned, others should be sprayed fairly frequently in spring and summer with Bordeaux mixture or colloidal copper.

LIME To the chemist, lime is the popular name for calcium oxide which the gardener knows as quicklime. In the garden the term lime is loosely employed for several different forms of calcium, but most commonly for calcium hydroxide, otherwise known as hydrated or slaked lime. Ground chalk and ground limestone may also come under this general term and are frequently used to 'lime' the soil.

Calcium is a plant food and very occasionally it may become so deficient in the soil that lime in some form or other must be added to increase the calcium content. More frequently, however, lime is not required because calcium is deficient, but because it is an alkali which neutralizes acids in the soil. (See *Acid*.)

Lime in one of its forms is always used to correct excessive acidity. The more lime is applied the more will the soil be changed in the direction of alkalinity. No hard-and-fast-rules can be given as to the amount of lime required to produce any given change as this will depend on the nature of the soil. Thus more lime is required to produce a given change on a soil that is heavily supplied with humus than on one that is markedly lacking in humus; in other words an acid sand can be corrected with a dressing of lime much smaller than that needed for an acid peat. The chart appended gives a general idea only of appropriate rates of application for hydrated lime. Ground chalk and ground limestone will produce the same effect but about twice the quantity will need to be applied. Chalk and limestone are slower in their action on the soil than hydrated lime or quicklime, although the rate increases the more finely the chalk or limestone is ground; in fact, if it were possible to grind them as finely as the powder which is naturally formed when quicklime is slaked, there would be little difference in their speed of action. Quicklime is quite as effective as hydrated lime at the same rates of application and also has

marked insecticidal properties because of the heat generated as it slakes in the soil. It is, however, a very unpleasant material to handle as it tends to burst bags and burn the skin. See *Quicklime*.

Lime tends to encourage some fungi which cause disease and discourage others, e.g. the fungus which causes club-root disease of cabbage and other brassicas cannot grow in a distinctly alkaline soil and is, therefore, checked by heavy applications of lime whereas the fungus which causes common scab disease of potatoes thrives in an alkaline soil and is, therefore, encouraged by heavy applications of lime.

In addition to these important functions of lime, it also has a marked physical effect on the texture of clay soils. This is due to the fact that lime will make the minute particles of such a soil cling together to form larger granules which form a soil more open in texture and less liable to bind or become waterlogged. This process is often referred to as flocculation. Regular liming of clay soils is usually adopted as part of the cultural treatment to improve them, but it must be carried out in connexion with acid-alkaline reaction tests and with reference to the type of plant to be grown upon them.

Lime can be applied at any time of the

year but it is usually most economical to use it in the autumn or early winter on heavy soils, and in late winter or early spring on light soils. It is generally applied as a top-dressing and then left to be washed down by rain, or it can be worked into the uppermost soil, with rake or fork. Lime in any form should not be applied at the same time as animal manure, particularly fresh animal manure, as it reacts with this to liberate ammonia gas which escapes into the air and represents a heavy loss of nitrogen, one of the most important plant foods contained in dung. Usual policy is to apply lime to land that was manured a year previously but if this cannot be done the manure should be well dug in first and then the lime applied as a top-dressing a few weeks later.

LIME SULPHUR Proprietary fungicides made by combining sulphur and lime and largely used in the control of apple and pear scab. The strength of concentrated lime sulphur is estimated in terms of its specific gravity, a normal formulation having a specific gravity of 1.3. Lime sulphur of this strength is applied at four different dilutions. The weakest of these is usually known as 'summer strength' and is made by adding 3 fluid ounces of the concentrated

TABLE OF LIME DRESSINGS

The relative acidity or alkalinity of soil is expressed in numerals preceded by the sign *pH*. Soil with a *pH* of 7.0 is neutral. Figures below 7 show increasing acidity on a logarithmic scale. Figures above 7 show increasing alkalinity in the same manner. It is not, however, possible to relate the quantity of lime to be added to a soil directly to its *pH* reading, owing to the fact that soils vary in their power of holding lime in an active form. Soils containing a high proportion of fine clay particles (colloids) or humus will absorb more lime than those of a coarse, sandy texture and will hold it longer. The more clay or humus a soil contains, therefore, the more heavily, but less frequently, it will need liming.

The following table is a guide to the quantities of hydrated lime necessary to correct varying degrees of acidity on soils of different types. All figures are for ounces per square yard.

<i>pH</i>	<i>Sand</i>	<i>Light Loam</i>	<i>Medium Loam</i>	<i>Heavy Loam</i>	<i>Peat</i>	<i>Clay</i>
6.5	5	6½	8	9½	11	12
6.0	6½	8	9½	11	12	13
5.5	8	9½	11	13	16	16
5.0	9½	11	13	16	19	19
4.5	11	13	16	19	21	21
4.0	13	16	19	21	24	24

fluid to 2 gallons of water. This can be applied safely to most varieties of apple and pear after the blossom falls or at any time during the summer. It is useful not only to control apple and pear scab and other fungal diseases, but also to reduce infestations of red spider. The second strength is 6 fluid ounces of concentrated fluid to 2 gallons of water and this is used in spring and summer on strawberries, when the flowers first open, to control tarsonemid mite. The third strength, usually known as 'winter strength', is 11 fluid ounces of concentrated lime sulphur to 2 gallons of water. This is applied to apples and pears prior to blossom time and particularly at those stages of bud development known as 'green bud' and 'pink bud' ('white bud' of pears). See *Bud Stages*.

This stronger winter application should be used in conjunction with the 'summer strength' application to control apple and pear scab. The fourth and strongest solution is 22 fluid ounces lime sulphur to 2 gallons of water. This is used in March to control cane spot of raspberries, blackberries and other bramble fruits, and also on blackcurrants to control mites which cause big bud. For this last purpose it should be used when the most forward leaves are one inch in diameter.

LINDANE The standard popular name for a 99 per cent (or better) extraction of the gamma isomer of benzene hexachloride BHC (q.v.).

LINEAR Long and narrow. A botanical term used in the description of leaves which are of this shape.

LIVER OF SULPHUR, see *Sulphide of Potassium*.

LOAM A mixture of clay, sand and humus but the term is by no means a precise one and many different types of soil may be referred to as loam. The ideal loam sought after by experienced gardeners as a basis for potting composts, will contain enough sand to keep the soil open and enough clay to prevent it drying out rapidly. Good loam always contains a considerable quantity of fibre provided by the

dead or decaying roots of grasses and other small plants. This fibre helps to maintain the open texture of the loam and when loam is being prepared for potting composts great care should be taken not to remove all the fibre from it by sieving it too finely. Loam which differs considerably from this ideal, may be described by qualifying adjectives such as light loam, meaning one containing a high proportion of sand; heavy loam, containing a high proportion of clay, and fibrous loam, containing an unusual amount of fibre. The term chalky loam is sometimes employed, but this type of soil is more correctly referred to as marl.

Loam is usually cut from the top spit of meadows. The turves should be stacked grass-side downwards in a heap and allowed to remain for at least twelve months, so that the grass may decay. Stacked loam will remain in good condition for a number of years, particularly if the stack is built with a ridged top to throw off rain.

LONDON PURPLE A poisonous arsenical dye-chemical sometimes used for killing

*Linear
leaves*



slugs. For this purpose $\frac{1}{4}$ pound London purple is mixed with 7 pounds of bran which may, if desired, be worked to a crumbly mash with a little water. This poison bait is sprinkled on the surface of the soil or placed in small heaps here and there where slugs may be expected to feed. London purple is poisonous to warm-

blooded animals and so should not be placed where dogs, cats, etc. might pick it up.

LOP To remove large branches from a tree or to shorten branches drastically, as in the operations known as pollarding and heading back. Severe lopping almost invariably destroys the natural symmetry and habit of a tree and should, in consequence, only be practised when absolutely unavoidable.

MAIDEN A tree or bush in its first year from grafting or budding. The term is principally applied to fruit trees, but it is also used for roses and occasionally for other trees and shrubs as well.

MALATHION An insecticide, allied to parathion but much less poisonous and therefore safer to use. It is particularly effective against all kinds of sucking pests, including aphides, capsid bugs, scale insects, thrips, red spider mite and white fly. It can be used as an aerosol or as an ordinary spray.

MALE Flowering plants all make use of the functions of sex and have male and female organs, though the way in which these are disposed differs considerably from one kind of plant to another. The majority of flowers are monoecious, i.e. there are both male and female organs in the same flower. The male organs are known as stamens and consist of anthers attached to filaments. There are also types of plants in which the flowers are dioecious, i.e. some carry only male organs (stamens) and others carry only female organs (pistils). There is still further differentiation in certain plants in which all the flowers on one plant will be of one sex only. Examples are holly (*ilex*), Sea-buckthorn (*hippophae*) and *Skimmia japonica*. In these the plants which produce nothing but male flowers are referred to as 'male plants'.

MANURE The derivation of this word is the same as that of manoeuvre and it is believed to have been applied originally to the general tillage of the soil rather than to its enrichment with any particular plant

food or foods. However, with the passage of time, this meaning has been changed and nowadays manure always refers to the food itself or to the act of its application.

Manures are of vital importance to the gardener as without them it is impossible to maintain the fertility of the soil. They may be classified in several different ways, e.g. as organic or inorganic manures (see *Fertilizer*); as artificial or chemical manures—these terms being practically synonymous—in contrast to animal manures and those derived from garden waste, dead leaves and similar material.

The term 'artificial manure' is unfortunate, as it often gives the impression that this type of manure is inferior or in some way unnatural. It cannot be too clearly stated that chemicals are the natural food of plants and that, therefore, there is nothing unnatural in the application of chemical fertilizers to the soil. In nature these chemicals are added partly by the slow weathering of rock and partly by the breakdown of complicated organic substances into simple inorganic chemicals, this breakdown being produced by the natural process of decay caused by the activity of fungi, bacteria and many other microscopic soil organisms. Plants are as incapable of living on complex organic substances, such as proteins and carbohydrates, as animals are incapable of living on simple chemicals. Indeed the two kingdoms, animal and vegetable, are interdependent, the vegetables transforming the simple chemicals which are their food into more complex starches, sugars, etc. and the animals consuming these by eating either the vegetables themselves or other animals which have themselves consumed the vegetables. Both vegetables and animals die and their bodies are returned to the soil, becoming manure which in time is broken down into simple chemicals once more. The same process is also applied to the dung of animals.

Nevertheless though it is true that plants cannot make use of organic manure until it has been changed by decay into simple inorganic chemicals, organic substances, and particularly those of a very bulky nature such as dung and vegetable refuse, have

certain notable advantages for soil feeding. Most important of these is that they almost always improve the texture of the soil, making it more open and yet more retentive of moisture in dry weather, and also easier to work at all times. Moreover by stimulating the multiplication of micro-organisms in the soil they ensure an adequate population of these to bring about the necessary breakdown from complex to simple chemical forms. A third point is that the plant foods in organic substances are generally liberated steadily over a fairly long period, thus ensuring a regular supply of food without serious shortages or excesses. By contrast some chemicals are available almost at once and if sufficient care in their application is not observed serious overdoses may result, with consequent harm to the plants. A final advantage that may be observed is that most bulky manures contain many plant foods including those such as manganese, magnesium, iron, sulphur, boron, etc., which are not present in the chemicals most commonly employed as fertilizers. In consequence there is less chance of minor chemical deficiencies occurring on soils that receive regular and adequate dressings of bulky organic manures than there is if chemical fertilizers only are employed.

The practice of manuring is one that has engaged the attention of gardeners and scientists for a very long time, but there is still a great deal to be learned about it. Plants require a number of chemicals as food but, as a rule, only a few of these become exhausted so rapidly in the soil that they must be frequently renewed. The most important of these are nitrogen, phosphorus and potassium, and occasionally magnesium or iron may be required as well. Still less frequently deficiencies may occur of manganese, calcium or boron.

Food in the soil is lost by being washed away into the subsoil or into drains, ditches, streams, etc., by being converted into gas and escaping into the atmosphere, and by being used by plants which are then removed from the land. Manuring is in part directed towards making good these losses and in part to altering the nature of the soil, making it richer than it was before,

or producing a different ratio between one food and another.

This matter of ratio can be of great importance and is usually referred to as 'balance'. If the balance of foods in the soil—that is to say the proportion of one in relation to another—becomes seriously wrong, growth of plants may be thrown out of gear. Thus too much nitrogen can produce an excessive growth of shoots and leaves, with a corresponding lack of roots and fruits. Too much phosphorus can produce an excessive growth of roots and too much potash excessive fruitfulness. These, it must be understood, are somewhat crude generalizations concerning effects which can have many subtle modifications. Contrariwise, lack of nitrogen may result in poor leaf development, and lack of phosphorus in weak roots and consequently general weakness into the bargain, while lack of potash may, in addition to causing poor production of fruit, also result in severe scorching of leaf margins. Lack of iron or lack of magnesium may result in severe yellowing of leaves, owing to a failure in the supply of chlorophyll, the green colouring matter of leaves. Many other symptoms are recognised as characteristic of various soil deficiencies.

The requirements of plants for different foods differ greatly, and the ideal would, no doubt, be to adopt a different manurial programme for each, according to its needs. This usually proves impracticable except in a few instances, and a kind of average of requirements must be arrived at which will suit a number of widely different plants. Fortunately plants themselves have considerable powers of selection and are not entirely dependent upon the gardener to give them a properly balanced diet.

The practice of rotational cropping is partly intended to make the best use of manuring by following one type of crop with another in such a way that the residues left by one will be used up by another. For example cabbages use a lot of nitrogen, but relatively smaller quantities of phosphorus. Carrots, parsnips and beetroot, by contrast, need a lot of phosphorus in relation to nitrogen. It is only common sense therefore, to follow one crop after the other, a

usual sequence being cabbages first and carrots, parsnips or beetroot next. This matter is more fully discussed under *Rotational Cropping*.

The best results can often be obtained by a combined use of both bulky organic and concentrated chemical fertilizers. The bulky manure ensures a suitable soil texture, a good population of micro-organisms and a steady supply of most of the necessary chemical foods. Then a few carefully chosen chemical fertilizers will alter the balance according to the known requirements of the crop—more nitrogen for leaf vegetables, more phosphates for root crops, more potash for fruits and so on. As a rule the bulky manures are best dug in during autumn or winter, while the chemical fertilizers are best applied as top dressings in late winter or spring, but inevitably these generalizations must be much qualified by the special needs of particular plants.

As manures of any kind can only be used by plants in solution, it is not surprising that gardeners have for long used manure in liquid form, particularly when they want a quick result. Nevertheless, though it is true that some chemicals can be absorbed directly by plants in solution in water, this is not invariably true and others must undergo change in the soil before they become available as plant food. This is true of organic substances such as urine or the liquid made by steeping dung in water.

Liquid manure is much used for feeding pot plants during their season of growth. It should always be used very dilute and generally should be applied rather frequently. Quite commonly weak liquid manure may be used every week in place of ordinary water.

Apparatus is available by which measured quantities of chemical fertilizers can be added to water as it flows along pipes to an irrigation apparatus such as an overhead sprinkler. By this means the physical labour of feeding can be greatly reduced and, incidentally, very great economy in use of fertilizer is claimed for the method. However most of the apparatus at present available is designed for commercial rather than for private use.

MARL A natural type of soil in which clay is blended with chalk. Marl occurs in several parts of the country, Nottingham marl being a favourite with gardeners. It has been much used as a top-dressing for sports grounds, particularly for cricket pitches, as it helps to bind the surface together and prevent it from disintegrating under the heavy wear which occurs when a long match is in progress. For this purpose the marl is passed through a fine sieve and then applied as a top-dressing not more than $\frac{1}{4}$ inch deep. Further small dressings may be given but not until the preceding dressing has disappeared, partly as a result of the growth of grass, and partly by being incorporated with the surface soil.

MASTIC The name sometimes applied to plastic substances used to cover grafting wounds, but grafting wax is the term more commonly used nowadays and the substance is described under that heading.

MCPA An abbreviation used for 4-chloro-2-methylphenoxyacetic acid, a chemical which acts as a plant hormone and, in excess, is a useful selective weed killer for the destruction of weeds on lawns. It can be obtained in the form of a powder mixed with a suitable carrier to be applied dry, or as a solution to be further diluted and applied as a fine spray. With either form manufacturer's instructions regarding rate of application should be followed.

MEALY BUG One of the most troublesome greenhouse pests. The insects are small and whitish, and they protect themselves with a white or greyish, waxy substance which at first sight looks like a little tuft of cotton-wool. The mealy bugs move about slowly on the stems and leaves of many greenhouse plants, including vines, and live by sucking sap from the plant. Growth may be greatly weakened as a result. Fumigation with nicotine or calcium cyanide is effective, while on a small scale, mealy bug may be controlled by sponging the leaves and stems with derris insecticide. Spraying with derris, with nicotine and soap, or with petroleum oil emulsion are other possible methods of keeping

this pest in check. When vines are pruned in winter great care should be taken to remove loose strips of bark, particularly round the spurs, as mealy bugs may be concealed beneath these. After this treatment the vines should be painted with a suitable insecticide such as petroleum oil emulsion or nicotine and soft soap.

MENDELISM Mendelism is the name given to the theories of inheritance propounded by Gregor Mendel, an Austrian monk, between the years 1860-1870. These theories were not taken up by other scientists at the time, but were rediscovered independently by three scientists in 1900 and have since formed the foundation of the modern school of genetics, in both this country and America.

The basic assumption made by Mendel was that for the purposes of inheritance the characteristics of any living organism can be split up into many separate units, and that these units are passed on from generation to generation unchanged though in many different combinations. Mendel further suggested that the presence of particular units in an individual might be masked by their coming into association with other units which were dominant to them.

One of Mendel's experiments which conveys this theory very clearly was carried out with dwarf and tall varieties of culinary peas. When a dwarf pea was crossed with a tall pea, all members of the next generation were tall, but Mendel found that if he fertilized these second-generation hybrids with their own pollen, in the next generation he obtained a proportion of dwarf plants again, in the approximate ratio of one dwarf to three tall. Further if the tall plants from this third generation were themselves fertilized, each with its own pollen and the progeny of each was kept separate, it became apparent that, though all outwardly tall, they were not all genetically of the same character, as some of them produced nothing but tall, whereas some produced tall and dwarfs in the same proportions as the first generation hybrids, i.e. one dwarf to three tall.

To explain this hitherto unobserved fact,

Mendel assumed that tallness and dwarfness can, for purposes of inheritance, be regarded as two contrasting units or factors, each distinct, indivisible and indestructible. These factors might be represented by the letter T for tallness and t for dwarfness. He further assumed that T was dominant to t, i.e. that if both T and t occurred in the same plant, the presence of t would be masked and the plant would appear tall. On this assumption, it will be seen that if a tall plant is regarded as having two doses of T, and a dwarf plant is regarded as having two doses of t, and if further it is assumed that the sex cells of these plants have only one dose of each of these characteristics, then when a tall plant is crossed with a dwarf plant the first will contribute one unit of tallness and the second one unit of dwarfness with the result that all the progeny will be of the character Tt. When these same plants are bred together, the sex cells will be equally of the character T and t, and if sufficient self-fertilized seeds are produced to allow the law of averages to work the possibilities of recombination will be as follows :

	T	t
T	TT	Tt
t	Tt	tt

It will be seen from this that out of every four plants, one will be pure for the factor of tallness, one will be pure for the factor of dwarfness and that two will be hybrid for this factor. But as we have already assumed that tallness is dominant to dwarfness, the two plants carrying the units Tt will be indistinguishable outwardly from the plant that is true for tallness. Therefore, in this generation we shall get three tall plants for every one dwarf plant. However, two out of every three tall plants will continue to breed as hybrids and so will continue to give the same proportion of one dwarf to three tall of which two will themselves be hybrid tall, while one will breed true for tallness,

the dwarf plants will all breed true for dwarfness, because, this character being recessive to tallness, it is only revealed when the plant is 'pure' for it, i.e. has two units of it.

Mendel made no attempt to explain the physical basis of this behaviour. It was left to Professor Bateson and other geneticists, notably Professor Morgan in America, to prove that this physical basis resided in the minute chromosomes or thread-like bodies which exist in the nucleus of the living cell and can be detected at certain stages of its division. Moreover it has been shown that the controlling units are, in fact, minute particles of matter or genes, distributed lengthwise along the chromosomes. Normally they are passed on from cell to cell and plant to plant as unchanged units, but occasionally they may be changed by radiation, chemical action or other causes. Such changes provide the physical explanation of the 'sports' or mutations with which geneticists and gardeners are familiar.

MERCURIC CHLORIDE A powerful poison, also known as corrosive sublimate, which is sometimes used in the garden to prevent the spread of club root disease among cabbages and other brassicas. For this purpose 1 ounce of mercuric chloride is dissolved in 10 gallons water and half a pint of this solution is poured into each hole prepared for a brassica seedling before it is planted out. The same solution is recommended as a remedy for gladiolus scab disease for which purpose the corms are immersed in the solution for 5 to 10 minutes prior to planting.

METALDEHYDE Metaldehyde is a chemical which can be purchased in the form of bars (often used as a solid fuel for portable irons) and as a fine white powder. It is useful to the gardener as a slug poison. For this purpose it should be mixed with bran, middlings, oatmeal or some other attractive bait in the proportion of 1 ounce of metaldehyde to 3 pounds of bait. If desired a little water may be added to make a crumbly but not wet mash. This poison bait should be placed in small heaps where slugs or snails are likely to feed, but out of

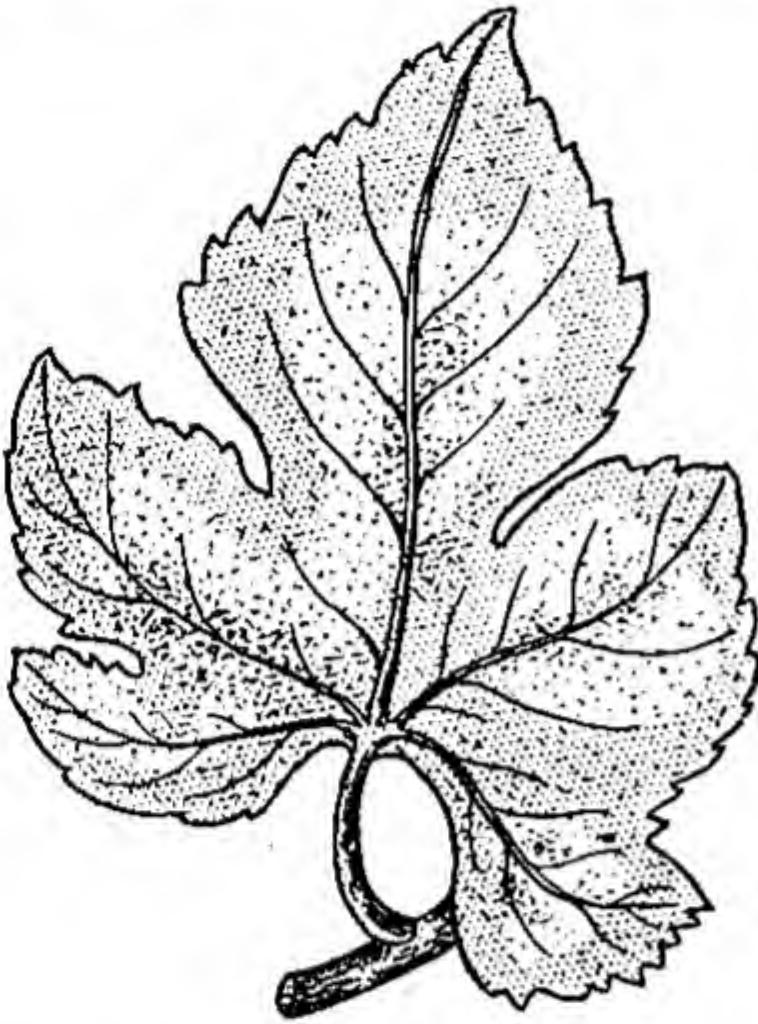
reach of birds and domestic animals to which it is poisonous. When metaldehyde is purchased in bar form the bars should be well crushed before use. One bar is sufficient to make half a pint of poison bait. If purchased in powder form a heaped table-spoonful is sufficient to make 1½ pound of poison bait.

MICE Great damage can be done to seeds and seedlings and to bulbs, corms and tubers of all kinds by mice. Crocus are particularly favoured and so are pea and bean seeds and those of marrows, cucumbers and melons. Mice may be poisoned by phosphorus paste spread on suitable baits such as fat, cheese or stale bread, or one of the many advertised mouse poisons or virus may be employed. Under glass, trapping is often the most effective remedy with either 'break back' traps or cage traps baited with fat, nuts, cheese or, probably best of all, cooked dried peas. Pea and bean seeds and small bulbs can be protected by rolling them in red lead prior to sowing. The seeds should first be moistened with either water or a very small quantity of paraffin.

MIDRIB The central vein of a leaf.

MILDEW A general name given to a number of unrelated diseases caused by various fungi and all having the common feature of covering leaves or stems with white powdery outgrowth. One kind of mildew is to be found on peas, particularly those maturing rather late in the season. Another mildew is common on chrysanthemums, and again is most noticeable in the autumn. Two particularly troublesome mildews attack gooseberries, and these are described under *Gooseberry Mildew*. The young growth of apples is liable to be attacked by the apple mildew and cabbages and allied plants have another mildew of their own. Roses, onions and vines are other plants on which mildews can be particularly troublesome.

All these mildews thrive in damp, cool conditions. Under glass, ventilation and a rather dry atmosphere are means of keeping them at bay. Vines grown under glass should be well thinned so that all the leaves

*Vine mildew*

have ample light and air. Dusting with flowers of sulphur is a useful preventive for all kinds of mildew, while with apples the routine lime-sulphur spraying carried out against scab will also keep mildew away. Rose mildew and the mildew found on many herbaceous plants and shrubs will usually yield to occasional spraying with

liver of sulphur at 1 ounce to 5 gallons of water, with 3 ounces of soft soap added to each 5 gallons of spray. Cabbage mildew is most easily controlled by spraying occasionally with Bordeaux mixture.

MILLEPEDES Several different species of small soil pests are found under the general name millepedes. All have thin, jointed bodies with hard coats and a great number of legs. Most are grey or blackish in colour, though a few are a dirty white or pink. The smallest are about $\frac{1}{2}$ inch long while the largest may be well over an inch. Some kinds, when disturbed, curl themselves up like the hair spring of a watch. Millepedes are often confused with centipedes but may be distinguished from them by their rather slow movements, their greater number of legs and dull colour. Centipedes by contrast are active, have fewer legs and are bright yellow or orange-yellow in colour.

Millepedes are to some extent scavengers, living on decaying matter in the soil, but they also attack the roots of plants and particularly roots that are already in an unhealthy condition. They may bore into soft roots or tubers such as those of the potato or carrot and in one way and another can cause a great deal of damage in the garden.

Finely powdered naphthalene forked or raked into vacant ground at 4 ounces per square yard or round cultivated plants at 2 ounces per square yard is a useful remedy. Many millepedes may also be trapped by burying sliced potatoes or carrots just beneath the surface of the soil. If each trap is first pierced with a wooden stick or skewer which is left sticking out of the ground, it will be a simple matter to collect the traps daily and empty them of their

*Millipedes**Mildew on apple leaves*

'catch'. Another remedy is to fork in a soil insecticide containing gamma-BHC.

MITE A general term given to a class of small creatures which, though popularly regarded as insects, are not insects in the scientific sense. Several of these mites are serious garden pests, among them the red spider mite, the big bud mite of blackcurrants and the mushroom mite. These are all dealt with separately.

MOLES These familiar tunnelling creatures can be a great nuisance in the garden despite the fact that they do not eat plants of any kind but live entirely on insects and other small creatures, many of which are themselves plant pests. When dealing with moles the gardener has to balance the good they do in destroying soil pests against the harm they do in loosening the soil under seed beds and in throwing up mounds on lawns. Even quite large plants may be disturbed by their burrowing and seedlings often fail completely if moles tunnel beneath them and their roots dry out.

Moles can be destroyed by trapping, by poisoning and by gassing. Special steel traps are made for the first purpose, and these are set across the underground runs. A piece of turf or some soil should be removed to allow the trap to be placed in position, and should then be replaced round the trap so as to exclude light, to which moles are very sensitive. Gloves should always be worn when setting traps as moles have a keen sense of smell and will easily be scared by human scent. Traps are most likely to prove effective if set across main runs and particularly those leading towards water, as these are likely to be used frequently.

Poisoning may be effected by using worms as bait and placing strychnine on these. Gassing is usually carried out with calcium cyanide, a fine white powder which gives off hydrocyanic acid gas when it comes in contact with moisture. If a little of this powder is placed in a run and the run is immediately sealed with turf, the gas will penetrate for a considerable distance and kill any moles that may be present. As this chemical and the gas it produces are

both intensely poisonous to human beings, care should be taken in using them. Calcium carbide, which is not poisonous, is sometimes recommended as an alternative. Though the acetylene gas which it produces may drive moles away, it will not kill them.



A mole trap

MONOCARPIC The name given to a plant which dies after flowering but takes an indefinite period to attain flowering age.

MONOCOTYLEDON A plant which normally produces only one cotyledon or seed leaf. This may be contrasted with a dicotyledon which normally produces two seed leaves. The distinction is an important one to the systematic botanist as it serves to distinguish one great group of flowering plants from another. The lily family, the amaryllis family and the iris family are familiar examples of the great group of monocotyledons, whereas the cabbage family, the buttercup family and the daisy family are equally well-known examples of dicotyledons.

MONOECIOUS The name given to a plant which has flowers of two sexes, some with stamens or male organs only, and some with pistils or female organs only, but flowers of the two kinds are borne on the same plant. A familiar example is the

common hazel, the male flowers of which form the familiar and showy catkins, while the female flowers are small, red, and held closely to the stems.

MORAINE The great accumulation of rocks, small stones and grit which occurs at the foot of, or beside, glaciers, and has been produced by the grinding effect of the ice on the surrounding rock. 'Scree' is a term given to a similar kind of formation composed of rock debris that has accumulated at the foot of a cliff or mountain. Natural moraines or scree have their own characteristic vegetation, consisting of plants which are able to survive with a minimum amount of nourishment and are usually supplied with abundant moisture in spring and summer from melting snow and ice, combined with the freest possible drainage. Such plants are extremely difficult to cultivate in the garden unless they can be provided with similar conditions, and moraines or scree are a frequent adjunct to ordinary rock gardens for the purpose of growing such plants.

Though there is really no real line of demarcation between the moraine and the scree in gardens, the former term is generally reserved for beds of small stones and grit which can be fed with water from below, whereas 'scree' is used as a term for similar beds which are not watered from below. Any small stone chippings can be used as a basis for scree or moraines, but if lime-hating plants are to be grown, the chippings should be of lime-free rock such as sandstone or granite. The pieces may be graded from the size of coarse sand to fragments that will only just pass through a $\frac{1}{2}$ inch mesh sieve, and some larger rocks and stones may also be embedded in the scree or moraine. The bed should be at least one foot and preferably two feet deep, and should, for preference, be placed on a slight slope with an outlet for water at the bottom so that drainage may be really free at all times. Moraine and scree mixtures vary greatly according to the purpose for which they are required, but as a rule, some soil is included. A good average mixture is 10 parts by bulk stone chippings, 1 part good loam, well broken up but not

sieved, 1 part good horticultural peat, preferably sphagnum peat, 1 part coarse sand.

If the moraine is to be constructed so as to be watered from below, this can be arranged by burying a length of water pipe at the highest point of the bed and about a foot below the surface, the pipe itself being drilled with a few very small holes and connected with a water main. A tap should be provided so that the water can be turned on and off at will. It must be stressed that the holes should be few in number and small in size or the moraine will quickly be converted into a bubbling morass.

MOSAIC A general term used to describe certain forms of virus disease, all of which are alike in causing a pale green or yellowish mottling of the leaves of the plants attacked. One of the most familiar examples is the raspberry mosaic. In the early stages of attack the plants have quite an attractive appearance with leaves variegated with yellow and green, but later the growth is weakened, crops become light and leaves may wither completely. Another kind of mosaic disease attacks lilies, causing a pale green mottling of the leaves, which may also have dark coloured spots and streaks. Flower buds may fail to open or become badly distorted. As these and other mosaic diseases are caused by viruses present in the sap of the plant, exterior



Mosaic disease on a parsnip leaf

treatments with sprays and dusts prove ineffective. All affected plants should be removed and burned and care taken to obtain stock that is known to be free of virus infection. These virus infections are mainly spread by insects or on the blades of pruning knives and secateurs. They are not carried in the soil and so there is no danger in replanting on the same soil provided care has been taken to remove all the mosaic-infected plants including their roots.



Raspberry mosaic

MOSS The name for one of the great divisions of the vegetable kingdom. Mosses are of many different genera and species and in some conditions of soil and climate they provide the major vegetation of the land. For example, there are areas in this country and even greater ones in Sweden almost completely covered by a dense growth of sphagnum moss and as the older plants die and decay, deposits of peat are formed which are known, because of their origin, as sphagnum peat. This moss peat is of particular value to the gardener as it is extremely absorbent of moisture and is of a fibrous or granulate nature, relatively free of dust, so that it does not tend to clog composts in which it is used.

Besides being of use to the gardener in the way just described, moss can also be a

great nuisance to him and it may become a serious weed on lawns, entirely destroying the grass. Mosses are usually an indication of certain conditions of soil. They are most likely to be found abundantly where the soil is naturally rather poor and damp, with high acidity and bad aeration, though some mosses are adapted to grow in dry places and may be found covering the surface of stones. Mosses are also to be found abundantly in shady spots.

In consequence, when mosses behave as weeds in the garden, the first line of attack should be to rectify the conditions which may have encouraged them. Drainage may be improved, soil fed with fertilizer or suitable animal manures, and it may sometimes be possible to admit more light by cutting dense trees, or lopping branches.

If none of these measures is possible, or having been tried, all fail to effect a sufficient improvement, the moss must be attacked directly. This may be done with various chemicals, particularly mercurial compounds such as calomel. Proprietary anti-moss dressings, embodying these chemicals, are available from dealers in horticultural sundries and should be used as top-dressings according to the manufacturer's instructions.

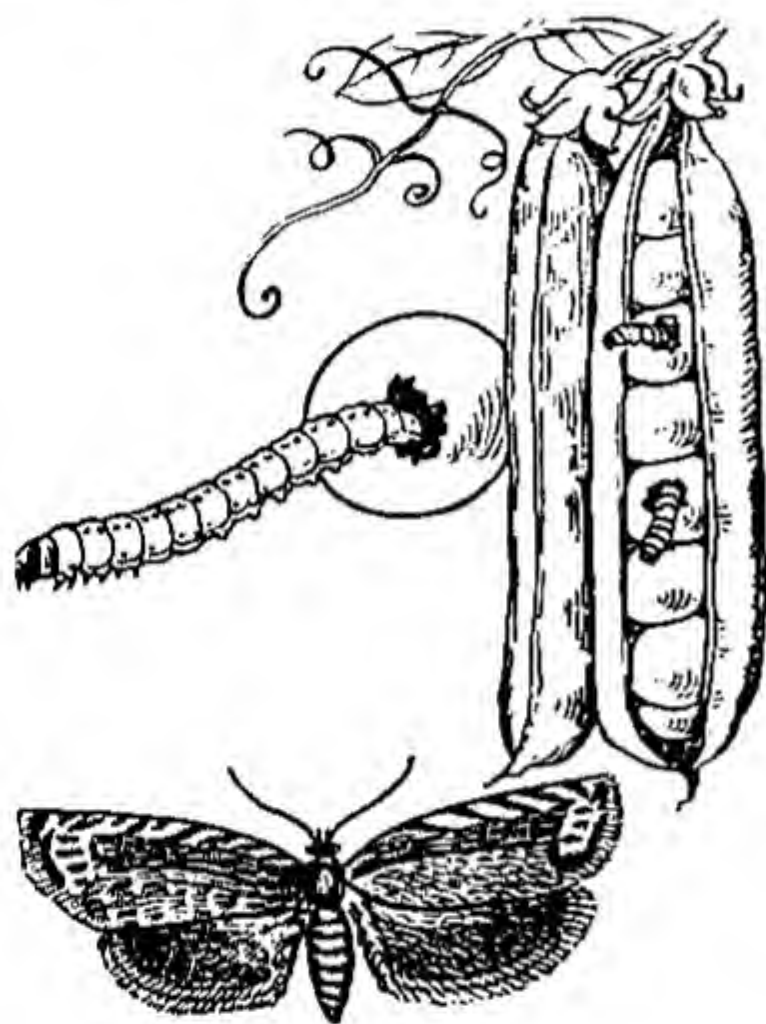
Permanganate of potash is a useful and safe chemical for killing moss, though not so effective as the mercurial compounds. It should be used at the rate of 1 ounce to a gallon of water—a gallon being sufficient to treat one square yard of moss.

Sulphate of iron is probably a more efficient moss-destroyer and also a cheaper one and this should be used at the rate of $\frac{1}{4}$ to $\frac{1}{2}$ ounce per square yard, preferably mixed with several times its own bulk of sand, to act as a carrier and ensure even distribution.

Hormone weedkillers do not destroy moss and may even indirectly encourage it by killing weeds which were previously in competition with the moss, and so leaving the moss a free hand.

MOTH Insects which are closely allied to butterflies, but may be immediately distinguished from them by the fact that the antennae of British butterflies are always

clubbed at the end whereas those of moths are not clubbed, though they may be feathery. Moths fly at night and many species are garden pests, not because the moths themselves do any damage to plants but because they lay eggs which then hatch out into caterpillars that feed on plants.



The pea moth

Familiar examples of moths which are troublesome in the garden are the cabbage moth, the caterpillars of which are green or reddish grey and feed on all kinds of brassica; the clearwing moth, the caterpillars of which attack currant bushes, boring their way into the pith of the stem and so causing the stem to wilt; the goat moth, the caterpillars of which are large and able to bore into quite large branches of trees, causing similar damage to that of the clearwing moth; the leopard moth, which attacks trees and shrubs in the same way as the goat moth; the pea moth, the whitish caterpillars of which are all too familiar in pea pods, particularly late in the summer, and the so-called winter moths, including the March moth, the caterpillars of which feed on the young leaves of apple and other fruit trees in the

spring. There are many others which may prove troublesome.

It is always the caterpillars and eggs rather than the moths themselves that are most vulnerable. The caterpillars can usually be poisoned by spraying affected plants with insecticides such as DDT, gamma-BHC, arsenate of lead or derris. The eggs may sometimes be killed by spraying with tar oil wash, DNC wash or similar preparations, but unfortunately these can only be used on hard-wooded plants while they are dormant in winter. They cannot be applied to plants in leaf nor to soft-stemmed plants because of their caustic action on these.

MOUSE-EAR, see *Bud Stages*.

MOWING The act of cutting grass, corn or any similar crop. In gardens the term is usually confined to the cutting of lawn grass, which nowadays is done almost entirely with mowing machines of one type or another. Nevertheless, it is still true that the first cutting of newly made lawns is best done with a very sharp scythe, provided this is used efficiently. Unfortunately few expert 'scythers' remain and it is better to cut young grass with a really sharp mowing machine than to do the work clumsily with a scythe.

The constant mowing of lawns has a profound effect upon their composition, tending in time to destroy the coarser grasses and weeds and to encourage fine grasses and some creeping weeds, such as daisies, mouse-eared chickweed, yarrow and clover. The more closely and constantly a lawn is mown, the more this selective effect is observed. It has been said that the famous lawns of England have been produced by 200 years of continual mowing; though this is not always literally true, there is an element of truth in it.

Nevertheless, it is not desirable to mow lawns very closely at all times; it should only be done when it is essential for the purpose for which the lawn has been made, as for example in bowling greens or putting greens. Very few grasses can survive such extremely severe cutting and those that do remain are not, as a rule, the best kinds to

withstand heavy wear. Lawns which are overmown, tend to develop bare patches, unless regularly fed and watered, and carefully tended. For all ordinary purposes the blades of the lawn mower should be set to cut about $\frac{1}{2}$ inch above the soil, and in autumn or early spring may be raised still further to allow about $\frac{3}{4}$ inch of growth of grass.

Some difference of opinion exists whether it is better to allow lawn mowings to fall on the turf and remain there, or to collect them in a grass box and remove them. If mowing is practised frequently during the spring and summer, there is much to be said in favour of allowing clippings to remain, though it tends to be unsightly for an hour or so. Longer clippings which can result if lawns are cut rather infrequently can smother the grass, causing bare patches. The advantage of leaving short clippings is that they act as a thin mulch, protecting the grass from sun scorching and also helping to feed the soil. If all the clippings are regularly removed, more feeding with chemical fertilizers or finely powdered animal manures and composts must be practised.

Mowing machines are of many different types and patterns ranging from the simple side-wheel lawn mower pushed by hand, to the elaborate roller lawn mower driven by a powerful petrol engine. All types have their special uses and value. For hand work, side-wheel mowers are the easiest to use, but they do not give quite the clean finish of the roller machine which, however, requires more power to propel it. For rough cutting, the side-wheel machine should always be used. Sizes most serviceable for hand-propelled machines are 12, 14 and 16 inches. Above 16 inches the labour of pushing becomes too great.

Power-driven mowers may be propelled by petrol-driven motors and also by electric motors. Petrol-driven machines have the advantage that they may be taken anywhere, whereas electrically-driven machines can only be used where electric current is available and even then must be connected with the electric mains by means of a flexible cable, which to some extent limits the places into which the machine

can be taken. Against this must be reckoned the fact that electrical machines suffer from no starting troubles, are much cheaper to run and maintain than petrol-driven ones, are nearly noiseless and very simple to handle. In most petrol-driven mowing machines the engine drives both the cutting cylinder and the roller and wheels which propel the machine forward; of electrical machines however, there are two types, one in which the motor drives the cutting cylinder only, leaving the machine to be propelled by hand, and the other in which the motor does both tasks.

An entirely different type of machine made possible by the use of motors, both petrol and electrical, is the rotary scythe in which a very rapidly revolving blade or blades, cuts the grass off by the speed of its motion instead of by the scissor action of the ordinary cylinder machine. Another application of mechanical power to grass cutting, is the motor scythe, usually with an oscillating blade of the same type as that used in farm hay cutters and reapers. Machines of this type can be employed to cut grasses and coarse weeds of almost any height.

MOWRAH MEAL An imported meal which is useful in the garden as a worm-killer. For this purpose the meal is sprinkled at the rate of 4 to 8 ounces per square yard over the surface of the lawn or other place in which the worms are to be killed, and is then watered in very freely. As a result the worms will come to the surface and die. Mowrah meal is most effective if used in damp mild weather, particularly in spring and early autumn.

MUCRONATE Ending in a short, stiff point. A botanical term used in the description of leaves of this character.

MULCH Any fairly heavy top-dressing applied to the soil. Mulches usually have a two-fold purpose, partly to feed the soil and plants growing in it, and partly to slow down surface evaporation and so conserve moisture in the soil. Mulches generally consist of some fairly bulky organic mater-

ial such as strawy manure, chopped straw, grass clippings or peat. They may be applied at any time of the year, though spring and early summer are probably the most favoured times. A secondary purpose of some mulches is to smother weeds. This aspect of the mulch can be particularly useful in shrub borders in which fairly heavy dressings can be spread and renewed from time to time throughout the year, with the result that weeds are persistently smothered and little further cultivation is required.

It has been suggested that a good mulch of grass clippings of one inch or more in thickness, applied to rose beds in early spring and maintained by occasional additions throughout the summer, will not only encourage more vigorous growth of roses, but also check the spread of Black Spot disease by preventing spores of the fungus which causes the disease from being splashed or blown from the soil on to the stems or leaves of the roses.

The more loose and littery the material of which a mulch is composed, the better will be its capacity for preventing evaporation of moisture from the soil. Incidentally, such mulches will also act as heat insulators, maintaining the soil at a more even temperature than would otherwise be the case. A drawback to mulches is that they are sometimes rather unsightly in appearance. Undoubtedly a mulch of strawy manure does not improve the look of the garden despite the fact that it is of considerable value to many plants. Another minor drawback, more noticeable in the case of fairly fresh animal manures than other materials, is that there will be a certain wastage of nitrogen by the escape of ammonia gas into the air.

MURIATE OF POTASH A chemical fertilizer which contains potash in combination with chlorine. Because of its chlorine content, it is not so safe to use as sulphate of potash and may, in excess, even act as a plant killer. Nevertheless, used in the correct quantities, which should not exceed 1 ounce per square yard at one application, muriate of potash is a good fertilizer, particularly for use on the more



Mulching fruit trees

permanent subjects such as fruit trees. For potting and seed mixtures sulphate of potash is always to be preferred. Muriate of potash contains 50 per cent. potassium.

MUSHROOM FLY The tiny maggots of this fly sometimes attack mushrooms in great numbers, riddling them with small holes. Attacks are likely to be more severe in hot, dry weather. DDT applied as a smoke or aerosol will destroy the pest.

MUSHROOM MITE A small creature, often mistaken for an insect though not technically an insect, which attacks mushrooms, causing dark brown sunken wounds to appear on the caps. The mites may occur in great numbers. The best remedy is to sprinkle finely powdered naphthalene at the rate of 4 ounces per square yard, on the paths between the mushroom beds.

MYCOGONE A fungal disease of mushrooms which causes white patches to appear on the gills. The whole mushroom may become distorted or produce warts. All diseased mushrooms, together with their stalks, should be removed and burned and the soil about them dusted with hydrated lime. The temperature of the mushroom house should be reduced below 50 degrees Fahrenheit, water should be withheld temporarily and plenty of air admitted. When this disease has occurred the mushroom house may be disinfected with formalin solution after the mushrooms have been cleared.

MYCOLOGY The name given to the scientific study of fungi. A person who practises this science is, therefore, known as a mycologist. As many plant diseases are caused by fungi, it is usually the case that a scientist who makes plant diseases his principal study is also a mycologist, but the name is not by any means confined to the study of harmful fungi.

NAPHTHALENE A chemical which is used as a soil and greenhouse fumigant (see *Fumigation*). For soil use finely powdered naphthalene is generally employed, and this is applied at the rate of from 2 to 6 ounces per square yard, either dropped into holes about 9 inches deep and 9 inches apart, made with a stout dibber, or forked or dug into the soil in the ordinary course of autumn or spring cultivation. In either method fumes are slowly given off from the naphthalene which is a volatile substance, and these penetrate the soil in all directions, either destroying insects or driving them out. It should be remarked that sometimes the second of these causes is at least as marked as the first, that is to say naphthalene is efficient as much because it drives pests into neighbouring ground as because it destroys them altogether. The effect on plants is not good at the highest rate of application mentioned, and this concentration should only be used on vacant ground, and then at least two months before it is to be cropped. Powdered naphthalene can, however, be used as a top-dressing to plants in growth at the rate of 1 or, at most, 2 ounces per square yard, and may then be left to lie on the surface or be lightly hoed in. It is most valuable against wireworms and millepedes, and may have some effect on woodlice, slugs and snails.

For greenhouse use, see *Fumigation*.

NARCISSUS FLY The larvae of two species of fly attack narcissus (daffodil) bulbs, eating right into them and causing them to decay. The larvae are putty coloured and quite large. Beds of narcissi should be hoed or raked frequently during May and June to fill crevices in which the flies might lay their eggs. Attacked bulbs

should either be burned or else sterilized by being immersed for an hour in water at a temperature of 110 degs. Fahrenheit.

NATURALIZE The practice of growing certain plants under as nearly natural conditions as possible. For example daffodils are said to be naturalized when they are planted in grass and left to look after themselves. The term is also used to describe plants from foreign countries which have established themselves so well in the country into which they have been introduced that they behave like native plants and are able to maintain themselves without the aid of the gardener. When plants have been naturalized in this manner for a very long time it is often difficult to decide whether they are, in fact, foreign plants which are naturalized or are genuine natives. A case in point is the stinking hellebore (*Helleborus foetidus*) which is found growing, apparently wild, in many parts of the country, but usually on or near the sites of Roman encampments, which lends colour to the belief that this is not really a British plant but one brought over by the Romans nearly 2,000 years ago.

NATURAL ORDER One of the major divisions used in the classification of plants. A natural order is composed of families which have many characters in common and are, in consequence, presumed to have a considerable degree of relationship. The term natural order is often erroneously used as synonymous with family. A family, in the botanical sense is an aggregation of allied genera, and frequently a smaller aggregation than that represented by the natural order which may contain several families. See *Classification*.

NECK ROT A disease of onions which may also attack shallots and garlic. It is caused by a fungus which infects the neck of the plant or the upper part of the bulb, causing this to turn brown and become soft. A greyish mould may appear on the diseased parts. Sometimes the disease may not be observed until the onions have been placed in store. There is no satisfactory remedy. Very large onions or those with

thick necks are most susceptible and good cultivation, resulting in medium-sized well-ripened bulbs, is the best means of prevention. Care should be taken to see that all onions are well dried before they are stored and that they are stored in a really dry, well-ventilated place.



An onion affected by neck rot

NECTAR The sweet liquid secreted by some flowers apparently with the function of attracting insects and so securing fertilization, as the insects carry pollen from the anthers to the stigmas of the flowers. It is from the nectar of flowers that honey bees produce honey and incidentally from the pollen that they prepare the substance known to bee keepers as 'bee bread'.

NEMATODE WORMS A group of worms mostly of small size, some microscopic, though a few are large, usually colourless and often, though by no means always, parasitic. The group is a very large one and includes many animal as well as vegetable parasites. The various eelworms which can be so troublesome in the garden belong here but in this book are dealt with separately under their own name. When the gardener speaks of nematode worms he

usually means certain of the larger, free-living species that are frequently found in soil that is rather too freely supplied with partially decayed organic matter. Such nematode worms may be a quarter to half an inch in length, transparent, and pointed at each end and they usually lash about vigorously when disturbed. They are not parasitic and may be regarded as scavengers as they live on dead or decaying organic matter. Nevertheless when they are present in great numbers they usually suggest a rather unhealthy soil condition and may indicate the need for liming, better cultivation and improved drainage.

NETTING The term is applied to the twine netting that is so frequently used by gardeners to protect fruit and other crops from birds, and to the galvanized wire netting which is mainly used in the garden to keep out pests such as rabbits. Old fish netting is frequently favoured for the first purpose. This has a diamond mesh and is usually sold by length, this being estimated when the netting is pulled out to its full extent lengthwise. When the netting is pulled out evenly in both directions for use as a cover, it will not be as long as stated by the salesman and this point must be allowed for when estimating size; in fact one third should be taken off the advertised length when estimating the actual coverage length. The advertised width will not be affected as this is correctly stated.

The size of mesh of twine netting is a matter over which a certain amount of confusion can arise. The term 'one-inch mesh', for example might mean a mesh of side one inch or of diagonal one inch, or it might mean a mesh that will only admit the passage of objects of diameter one inch or less (compare 'one-inch screen').

The constant dimension in a mesh is the length of one side, technically known as a 'bar'. When ordering netting, therefore, the purchaser should follow the custom of the trade, and specify 'one-inch bar', '3-inch bar, square' and so on. If, in addition he states the length along the selvedge (the long side), which is usually mounted on a rope or otherwise strengthened, and the number of meshes in the width he re-

quires, he will always know that he will get what he orders, without having to worry about losses of length when spread out. Netting, incidentally, is always assumed to be diamond-mesh unless otherwise stated.

Nets should be cleaned, repaired and treated with preservative (there are several fluids sold for this purpose) before being stored for the winter. It is worth pointing out that net-making and repairing is a perfectly simple business which the gardener can easily undertake on his own account if he feels inclined. There are at least three good books on the subject.

Galvanized wire netting used to keep out rabbits should not be more than one-inch mesh and preferably rather less. It should rise at least 3 feet vertically out of the ground and be buried at least 9 inches in the ground. It is better that these measurements should be exceeded. If coarser mesh wire is used, very young rabbits will get through, and eventually the ground inside the wiring may become as heavily stocked with rabbits as that outside.

NICKING, see *Notching*.

NICOTINE A powerful alkaloid poison which is valuable to the gardener because of its insecticidal properties. It is particularly useful for destroying greenfly and other forms of aphid, and it is also of use against sawfly larvae, including the destructive apple sawfly, and, to a lesser extent, against leaf-mining maggots. It can be used as a liquid spray, as a dust and as a fumigant, but it may be observed that, being a volatile substance, its efficiency as an insecticide is always, to some extent, bound up with the vapour which is produced from it. Because of this the liquid and powder forms are much more efficient in warm weather than in cold, in fact, at temperatures below 65 degrees Fahrenheit they lose a great deal of their value. This is a drawback as it means that nicotine cannot be used with full efficiency outdoors early in the year, unless the weather happens to be unusually mild. A second drawback is the fact that it is an extremely powerful poison to human beings and all warm-blooded animals. It is true that at

the concentration at which it is usually employed as a spray its poisonous properties are greatly reduced and, further, that, being so volatile, the spray usually loses all poisonous properties within a few days. Nevertheless this is an insecticide which must be used with due precautions.

As a liquid, nicotine can be purchased either as so-called 'pure' nicotine (which is in fact usually 97 per cent. pure), or as a diluted solution with or without a spreading agent. Pure nicotine is used at strengths varying from $\frac{1}{4}$ to $\frac{1}{2}$ a fluid ounce to 5 gallons of water and it is an advantage if 6 ounces of soft soap or an appropriate quantity of a proprietary spreading agent is added to the solution. Diluted proprietary brands of nicotine must always be used strictly in accordance with manufacturer's instructions and, if a spreading agent is already incorporated in the spray, no further addition need be made. Liquid nicotine should always be applied in the form of a heavy wetting spray; the more fully it can be brought into contact with the bodies of the insects to be destroyed, the more effective it will be.

Nicotine dust is sold ready mixed with a suitable carrying agent and has only to be scattered or blown over the plants to be protected.

See also *Fumigation*.

NITRATE Any salt of nitric acid. In the garden the term is frequently used as an abbreviation for almost any concentrated nitrogenous fertilizer such as nitrate of soda, nitrate of potash, Chilean nitrates, etc.

NITRATE OF POTASH, see *Potassium Nitrate*.

NITRATE OF SODA A very quick-acting nitrogenous fertilizer which is useful to induce rapid growth particularly of leaf and stem. It is highly soluble, and fairly easily washed out of the soil; in consequence it is usually applied just before a crop is sown or planted, or while the crop is in growth. In excess, nitrate of soda can have a damaging effect on plants, scorching leaves and tender growth and even killing plants altogether. It is never wise to exceed

a rate of application of 1 ounce per square yard at a time, and no more should be given until this has been largely used up or washed out of the soil. The analysis of nitrate of soda shows $15\frac{1}{2}$ to 16 per cent. nitrogen. Nitrate of soda can also be used as a liquid manure at the rate of $\frac{1}{4}$ to $\frac{1}{2}$ ounce per gallon of water.

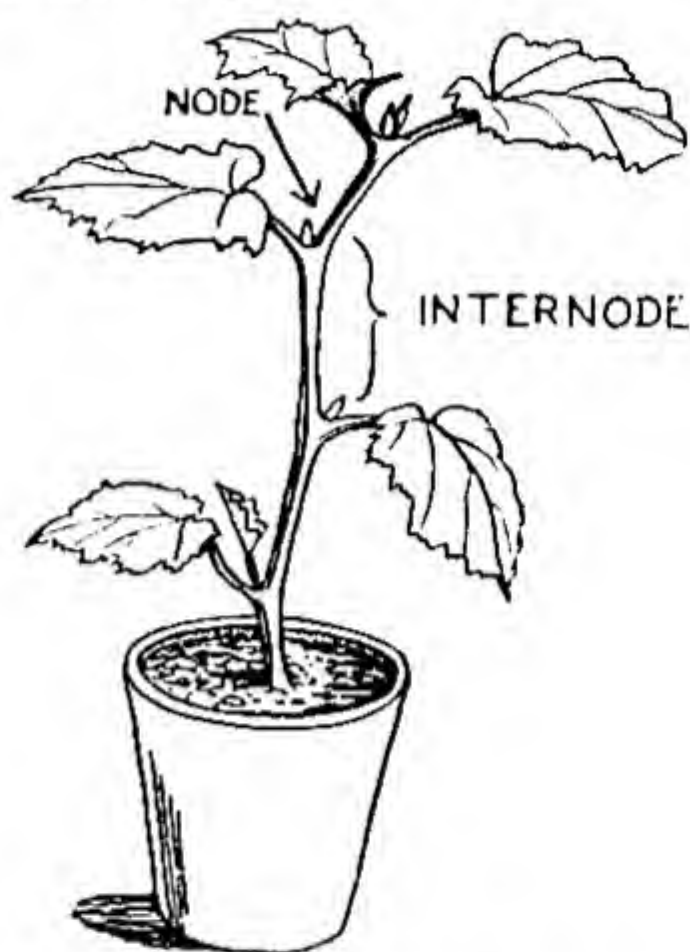
NITROGEN An element which enters into the composition of plant growth and is an important plant food. Nitrogen itself is an inert gas and it forms four-fifths of the atmosphere of the world. It cannot, therefore, itself be applied to the soil, though organisms exist in the soil which are capable of converting the gaseous nitrogen of the air into salts of nitrogen, in which form they are available as plant food. The bacteria which form nodules on the roots of leguminous plants, such as peas and beans, are of this nature, and there are also bacteria living free in the soil which have the same power. The gardener sometimes enriches the soil with nitrogen by sowing leguminous crops on the ground and then digging them in, but more frequently he makes use of animal manures or chemical fertilizers containing salts of nitric acid.

Most animal manures contain some nitrogen, but the quantity is liable to decrease the longer the manure is kept, partly by escape of nitrogen as ammonia gas to the atmosphere, and partly by nitrogen salts being washed away by rain. Moreover a great deal of the nitrogen in animal manure is in the liquid part of the manure and, unless steps are taken to preserve this, the quantity of nitrogen retained may be small. An average well-rotted sample of horse manure will contain $\frac{1}{2}$ to 1 per cent. nitrogen.

The principal chemical fertilizers containing nitrogen, are nitrate of soda, sulphate of ammonia, Chilean nitrate, Nitro-chalk, nitrate of lime, nitrate of potash and calcium cyanamide. Concentrated organic fertilizers which contain nitrogen are dried blood and hoof and horn meal.

The most marked effect that nitrogen has upon plants is to increase the rate and vigour of their growth and to deepen the green colour of foliage. As it is one of the

foods most readily washed out of the soil and most rapidly used by all plants, it is also one of those which the gardener has most need to apply.



Node and internode

NODE The joint of a stem at which point a leaf is borne or may be borne. Cuttings which are severed just below a joint are frequently described as nodal cuttings, whereas those which are severed midway between joints are described as internodal cuttings. Frequently a growth bud or buds will be found at each node and it is also true that the cambium layer at this point is usually more capable of producing adventitious roots or buds than the cambium in other parts of the stem.

NOTCHING and NICKING The practice of making an incision above (notching) or below (nicking) a dormant growth bud, usually of a fruit tree. Nicking tends to check growth, notching (in which a small triangle or crescent of bark is sometimes removed) to encourage it. The operation is usually done in May.

NURSERY That portion of the garden reserved for the rearing of young plants. The term is particularly applied to the beds in which plants are grown on after they leave the seed bed. Thus instructions to



Notching above a bud

plant out in the nursery bed simply means to plant out in a piece of ground in which the plants can remain until they become large enough to go into their permanent quarters. Nursery beds are usually made in some out-of-the-way part of the garden as, for example, a plot in the vegetable garden. The ground should be well cultivated and thoroughly drained and, if possible, be provided with some means of applying extra water in dry weather as the rate of growth of young plants is usually very adversely affected by drought. A nursery garden is a garden wholly devoted to the raising of young plants.

OBTUSE Blunt or rounded. A botanical term used in the description of leaves which are of this character.

OFFSET A young plant produced vegetatively alongside another plant and easily detached from it. The term is most commonly applied to bulbs and corms which usually produce offsets freely as a natural means of increase. The term, however, is also applied to fibrous-rooted plants, particularly to plants which form a number of separate crowns of shoots rather loosely connected together. Propagation by re-

moval of offsets is really a form of propagation by division. Offsets, being vegetative in origin, almost invariably resemble the parent plant in every respect. See page 188.

ONION FLY The small white maggot of this fly attack young onions at, or just below, soil level, causing the foliage to flag. The best remedy is to sprinkle 4 per cent. calomel dust round the seedlings when about $1\frac{1}{2}$ inches high and again 10 days later.

OPPOSITE A botanical term describing a particular mode of producing leaves, in which the leaves appear in pairs on opposite sides of the stem. This may be contrasted with alternate, in which the leaves are produced singly and are usually arranged in a roughly spiral formation on the stem.



Opposite leaves

ORGANIC Any chemical compound of carbon. As a great many organic chemicals are derived from living organisms, the term is often loosely used to describe sub-

stances obtained from such organisms, in contrast to those obtained from non-living sources. For example the terms organic gardening and organic manuring are frequently used to describe those systems of gardening and manuring which rely exclusively on bulky animal manures and vegetable composts and make no use of concentrated fertilizers. This, however, is really a misuse of the word, as there are many organic chemicals which are not derived from living organisms and many which are synthetically produced in the laboratory.

Plants are not designed by nature to make direct use of organic substances, their food being simple inorganic chemicals which they then synthesize, with the aid of sunlight, into more complex organic substances such as starch and sugar. The importance of organic substances in the soil lies in the effect which they have on soil texture and the micro-organisms which live in soil. Most organic substances undergo a process of decay in the soil and this decay is brought about largely by the activities of fungi, bacteria and other micro-organisms. In the absence of sufficient organic matter, these micro-organisms are reduced in numbers and, unless suitable inorganic foods are applied in carefully controlled quantities (as is done when using hydroponic and other 'soiless' methods of cultivation), the soil quickly becomes unbalanced in food and the growth of plants is retarded or prevented. Moreover the presence of an abundant population of micro-organisms, particularly fungi, in the soil, improves its texture, helping drainage in wet weather and at the same time enabling the soil to absorb sufficient moisture to withstand reasonable periods of drought. It will be seen, therefore that any wise system of gardening will take into account the value of both organic and of inorganic substances and will not rely on one to the exclusion of the other.

OVATE In outline like an egg. A botanical term used in the description of leaves which are of this shape.

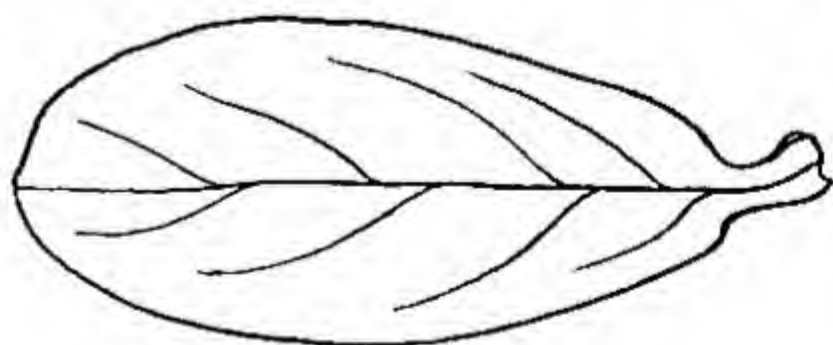
OXYGEN An element which is a gas,

and which forms one-fifth of the atmosphere of the earth. It is an essential plant food but is always present in sufficient quantity in any normal supply of air and need never be specially applied. Oxygen is required by the roots as well as by the leaves of plants, and this is one of the reasons for maintaining a good granular structure in the soil so that air may penetrate between the crumbs and reach the roots. If the soil becomes too consolidated or too waterlogged, air is driven out and the roots die in consequence.

OYSTER SHELL Crushed oyster shell is sometimes used as a substitute for lime or sand. It is, however, too expensive for widespread use and has no special advantages over them.

PALMATE Divided in the form of a hand. A botanical term used to describe leaves which are deeply divided into several lobes. The term 'digitate' has a somewhat similar meaning but is usually reserved for leaves that are composed of several separate leaflets united to a common stalk at the base.

PAN A term used to describe the hard layer of soil which may be formed through faulty methods of cultivation, and which, by becoming impermeable to moisture and air, may have a very adverse effect upon plant growth. In farm practice a pan often occurs a few inches beneath the surface as a result of constant ploughing to the same depth, the smooth base of the plough pressing the soil beneath the furrow into a hard cake. The same kind of effect can be produced when rotary hoeing is continued year after year to approximately the same depth on soils which are rather sticky; in fact panning is always more likely to be a



An ovate leaf

trouble on clay soils than on those of a sandy nature. A natural pan unconnected with cultural practices often occurs on soils heavily supplied with iron. It may be necessary to break up such pans before satisfactory cultivation can be carried out.

Surface panning, that is to say, the production of a smooth hard surface to the soil, is liable to occur after heavy rain on the heavier types of soil and may be aggravated by faulty treatment, such as walking on the soil while it is still wet, or rolling it before it has had time to dry out sufficiently.

Absence of sufficient humus and grit in the soil can both aggravate panning and the addition of these materials will help to prevent panning.

When panning has occurred despite precautions, the layer of hard soil must be broken up by suitable cultivation, such as deep digging, or trenching, when the pan is several inches below the surface, or surface forking and hoeing for surface pans.

PANICLE A particular kind of flower



Panicle

cluster consisting of several separate branches each of which carries numerous stalked flowers with the youngest at the top.

PAPPUS The tuft of hairs or bristles found in the flowers of some members of the daisy family and which later enable the seeds to become airborne.

PARADICHLORBENZENE A strong-smelling chemical which is useful as a soil fumigant (see *Fumigation*).

PARAFFIN EMULSION Paraffin is an effective insecticide, but unfortunately it also has an extremely harmful effect upon plants in its pure state. However, if emulsified with soap and water, it can be used with safety, and years ago this was one of the most popular sprays for dealing with greenflies and other aphides. It has, however, to a very large extent been superseded by more powerful insecticides such as nicotine and HETP. The method of preparing paraffin emulsion is as follows. Boil 10 ounces soft soap in 1 gallon of water, add $\frac{1}{2}$ pint of good quality paraffin and churn vigorously for several minutes, preferably by placing an ordinary garden syringe in the solution and blowing it in and out rapidly. Make up to 4 gallons, churn again and use immediately. If left to stand for any length of time, the paraffin will tend to go out of the emulsion and may cause scorching of foliage and tender growth.

PARASITE Any living organism which lives upon another living organism, in contrast to a saprophyte which is a living organism which lives on a dead organism. Dodder is a plant parasite which lives on gorse and other heathland plants. It is entirely dependent upon the gorse or host plant for its nourishment and has neither roots nor leaves of its own. Mistletoe is mainly parasitic and has no roots, but it does possess some green leaves which are capable of manufacturing food and is, therefore, not a pure parasite. Nevertheless it cannot live except in association with a suitable host plant.

PARATHION An organic phosphorus

compound that is widely used as an insecticide in commercial establishments but is generally regarded as too dangerous for use by amateurs. It acts both as a stomach poison and as a contact insecticide and is effective against a wide range of pests including aphides, capsid bugs, caterpillars, flies, thrips and mites. It is largely because of its ability to kill red spider mite that it has become so popular in nurseries and in orchards. Unfortunately Parathion is also very poisonous to all warm blooded animals, including human beings, and may be absorbed through the skin or inhaled as well as being taken through the digestive system. Moreover, it is much more stable than either HETP or TEPP, with which it may be compared in many respects, and so its poisonous effects may remain for a considerable time after it has been applied. Protective rubber clothing, including rubber gloves, should be worn when it is applied and it is also recommended that a gas mask be used. Manufacturer's instructions should be followed, both as regards any further safety precautions and strength of application.

PARIS GREEN A compound of arsenic which is sometimes used as an insecticide. It is particularly useful when mixed with a suitable bait for destroying slugs, snails and woodlice. For slugs and snails, dried bran makes a very effective bait, though many other substances can be used, such as oatmeal, breadcrumbs, old tea leaves, etc. For woodlice the most effective bait is dried blood. Suitable recipes are as follows: $\frac{1}{2}$ lb. of Paris Green to 7 lb. of bran; or, 2 oz. Paris Green with 7 lb. of dried blood. With either recipe the prepared bait should be placed in small heaps where the pests are likely to feed. It is often an advantage to place pieces of board or slate over the baits, both to prevent domestic animals from eating them and to make dark, moist shelters into which the pests are likely to go.

PARTERRE An elaborate arrangement of beds of geometrical design. Frequently the beds are defined by formal edgings of clipped box and sometimes the beds are themselves of turf or gravel instead of soil,

the whole design being carried out by the edging shrubs or plants. It is a form of gardening highly developed by French and Italian designers of the sixteenth century. When parterres were planted it was an invariable rule to use only plants of comparatively low growth and to encourage the covering of the whole of the ground within each bed. As a rule only one or two varieties of plant were used per bed. The whole parterre garden was generally cut off from the remainder of the garden by some formal division such as a stone balustrade.

PARTHENOCARPIC A term applied to describe a fruit that has been produced without fertilization. Some kinds of plant produce parthenocarpic fruits of their own accord, e.g. greenhouse cucumbers. In other instances parthenocarpic fruits can be produced by applying very minute quantities of a suitable hormone to the flowers or the tiny fruits. This treatment has been used very successfully on tomatoes and also with fair success on strawberries (see *Hormones*).

PATHS Paths have been described as the backbone of the garden and this they very well may be. It is certain that well-made paths add greatly to the comfort of the garden and also, to some extent, when once made dictate the rest of the design. This is not to say that the first thing to do, when developing any new ground, is to lay paths without thought of what is to follow. That was a policy too frequently adopted by the speculative builder of years ago and the result was almost invariably unhappy. The right course is to plan the whole garden from the start before the ground is even touched with the spade, let alone dealt with in any more permanent manner. In this original plan great consideration should be given to the provision of paths, considering these not only as purely utility items, giving ready access to every part of the garden, but also as a part of the artistic scheme.

The width of paths will naturally vary greatly according to the purpose which they have to serve. In the rock garden they may be reduced to tracks no more than a

foot in width, whereas main drives for use for motors may be 15 feet or more wide. But taking an average throughout the garden, the ordinary paths for walking on should not, as a rule, be less than 2 feet wide and from 3 to 4 feet may be considered a more convenient width. There is nothing more annoying than a number of paths so narrow that it is difficult to pass or walk abreast on them. Nor is there anything which is apt to give a garden a meaner appearance.

Many surfacing materials may be used and each has its own particular advantages and drawbacks. One feature is essential, however, in all path making and that is a good foundation of some hard material such as brick ends or clinkers. This also should be at least 6 inches thick, for the purpose is not only to provide a firm foundation for the surfacing material, but also to allow water to drain away freely. If water collects beneath the surface in winter and then freezes, it will exert a powerful pressure and in time will break up the best-made paths.

Rectangular paving Genuine Yorkshire paving slabs or other stone slabs of the same character make a most dignified and satisfactory material for paths of all types, except those in the wildest or most natural parts of the garden. These slabs can be purchased in a variety of sizes and almost always in squares or simple rectangles of some kind, and they can be laid in patterns if desired. Furthermore, they can be bedded in some loose material such as sand or sifted ashes or, for a more permanent result, they can be bedded in cement. The latter method suffers from the slight drawback that it is not so easy to establish plants in the crevices between the stones. This may or may not be considered a disadvantage according to the reaction of the gardener to plants in paths. However, it is possible to grow some plants even in cement-bedded paths if some crevices are left open, no cement being placed either in or beneath them.

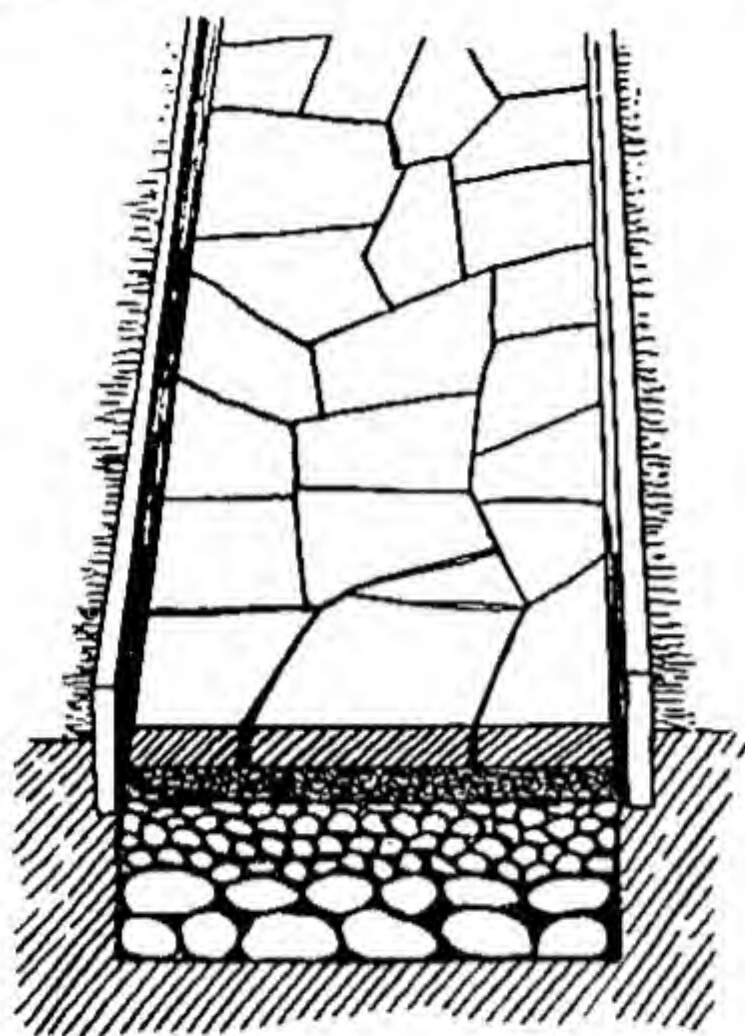
The concrete for this purpose should be made by mixing 2 parts by bulk of coarse aggregate, 1 part of builder's sand, 1 part of cement. Mix these ingredients thor-

oughly while dry, and then add water a little at a time until the whole can be worked quite freely and is about the consistency of rather stiff porridge. This concrete should then be spread to a depth of at least 2 inches on the hard core forming the foundation, and the paving slabs should be bedded down on it. Be very careful to keep the joints between one stone and another as level as possible, and do not make any attempt to fill the spaces between the slabs at this stage. This should be done a few days later when the base cement is already firm. Pointing should then be done with concrete made by mixing 3 parts of sand to 1 of cement, which may be coloured with a little yellow ochre, if desired, to get it exactly the same tone as that of the stones themselves. If paving slabs are laid in loose sand or ashes, they should be bedded down with great care, keeping the edges quite level. Then, when all the slabs have been laid, some more sand should be scattered over the surface and brushed down into the crevices with a stiff broom.

Crazy paving This material is much favoured, particularly in the smaller or more informal gardens, and it has the merit of being cheaper in some districts than rectangular paving slabs. The price will vary a good deal, however, from place to place, as this is a heavy material and carriage charges can soon mount up.

Crazy paving is usually offered in several distinct thicknesses which may vary from $\frac{3}{4}$ to $2\frac{1}{2}$ inches. As a rule pieces ranging from $\frac{3}{4}$ to $1\frac{1}{2}$ inch thickness are graded together as 'thin' crazy paving, and those from $1\frac{1}{2}$ to $2\frac{1}{2}$ inch in thickness are sold as 'thick' crazy paving. When these gradings are adopted, it will be found that, on an average, thick crazy paving will cover about 9 square yards per ton of material and thin paving about 14 square yards per ton.

The same remarks regarding laying apply as with the rectangular paving slabs above, i.e. crazy paving can be set in either a loose dry material such as sand or ashes, or in concrete, and with the same comparative advantages and drawbacks. Two differences to be observed are, (1) that because of the irregular shape of the slabs, considerably more ingenuity will need to



A crazy paving path

be exercised in fitting them together, so that there are no gaps between the adjacent slabs more than one inch or so in width, and that, (2) as the slabs are likely to vary a little in thickness not only as between one slab and another but even in different parts of the same slab, even more care will be needed to maintain a dead level surface. It will be necessary to scrape away the concrete, sand or ashes where the slabs are thick and add to the layer where they are thin, and for this purpose a builder's trowel should be kept at hand throughout the work of laying. As to the method of fitting the slabs, each workman will probably have his own ideas, but one which proves serviceable is to place some of the larger slabs in position first, and then fill in the spaces between them with smaller pieces, much as one would do in fitting a jig-saw puzzle together. Pointing with either smooth cement for a concrete-bedded path, or with sand or ashes for a loose-bedded path, should be carried out in exactly the same manner as described for rectangular paving slabs.

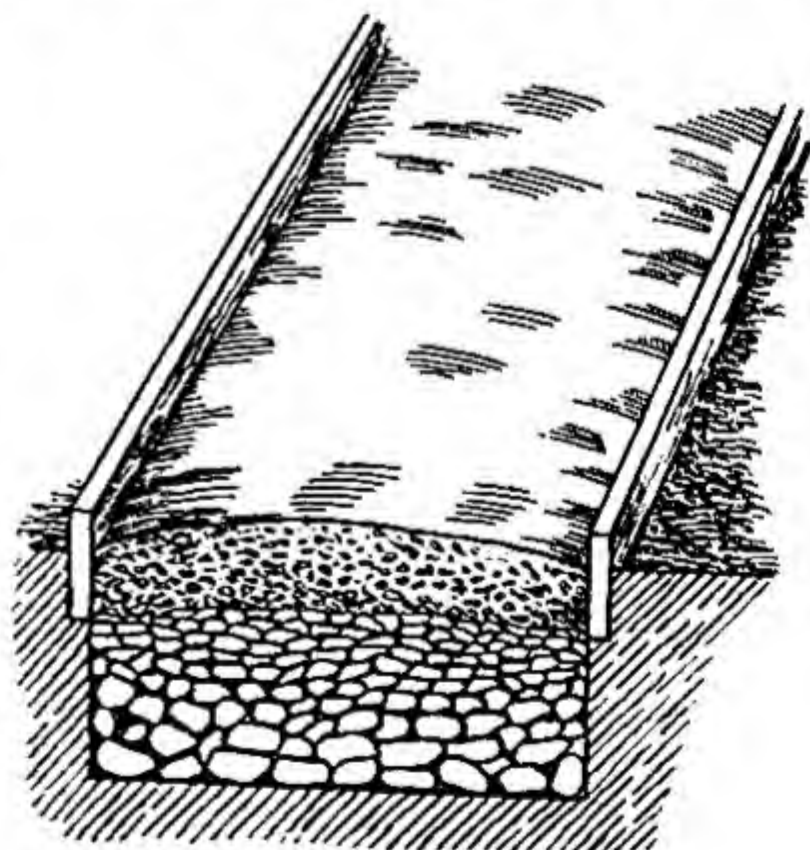
Concrete Durable and clean paths can be formed of concrete alone. One drawback to this material is that it does not weather so readily or pleasantly as natural stone

and, in consequence, never becomes quite so much part and parcel of the garden. Nevertheless, concrete has the great merit of being a comparatively cheap material and one which is fairly simple to use.

Concrete should be prepared as already described for the foundation of the stone base path. It should be spread on the hard rubble foundation, to a depth of at least 2 inches and should be made level with a piece of straight-edged wood. It will not be a drawback if some slight impressions of the edge of the wood are left on the concrete, giving it a faintly ribbed surface, as this will make it less slippery to walk on in wet weather.

If desired, concrete can be coloured in almost any manner, yellow ochre and venetian red being two of the most popular colourants. It is advisable to do a little experimenting with a small quantity of concrete before making the final mixing and to allow the samples to dry out thoroughly before pronouncing on the result, as the colour will change as the concrete becomes dry.

It is most important that concrete paths should not be allowed to dry too rapidly, nor under any circumstances must they be exposed to severe frost before they are completely set, though light ground frost may do them no harm. If paths have to be laid in warm weather, they should be covered



A gravel path

with damp sacks and these should be kept moist for at least a week while the concrete is setting slowly beneath them. If concrete has to be made during winter or early spring, a sharp watch should be kept for frost, and at the least danger of this the concrete should be covered with dry sacks. This precaution should be observed for several days after the concrete has become firm on the surface, as there will still be a lot of moisture beneath.

If desired, concrete can be laid to imitate either rectangular paving slabs or crazy paving. If the former is decided upon, the simplest method is to mark out the position of the slab with smooth wooden laths, which should first be well greased. Then the concrete is spread level with the top edges of the laths, and when it is dry the laths should be carefully removed. An alternative is to pre-cast the slabs in shallow wooden moulds, and then lay them exactly as if they were natural paving slabs.

Imitation crazy paving can be made by either of these methods, but a simpler plan is to mark the crazy paving pattern on the surface of a plain concrete path with the point of a mason's trowel. This should be done when the concrete is partly set.

Bricks Bricks laid on edge make a very attractive and durable path, but they suffer from two drawbacks, (1) that they are comparatively costly and (2) that they become extremely slippery in wet weather particularly if rubber-soled boots or shoes are worn. The bricks can be laid in a simple pattern or in herringbone formation such as one often sees in a parquet floor. As with paving slabs, the most durable result is obtained by setting the bricks in concrete and the same method should be employed.

Asphalt At one time asphalt was an extremely popular paving material, but it is not seen so much nowadays, no doubt because it never looks very well in the garden, which is in part due to its black colour, and in part to the fact that the tar in it discourages the growth of all plants, even plants spreading from adjacent beds, and so the path never becomes assimilated with the garden. Nevertheless asphalt has the merits of being easily and quickly laid, and

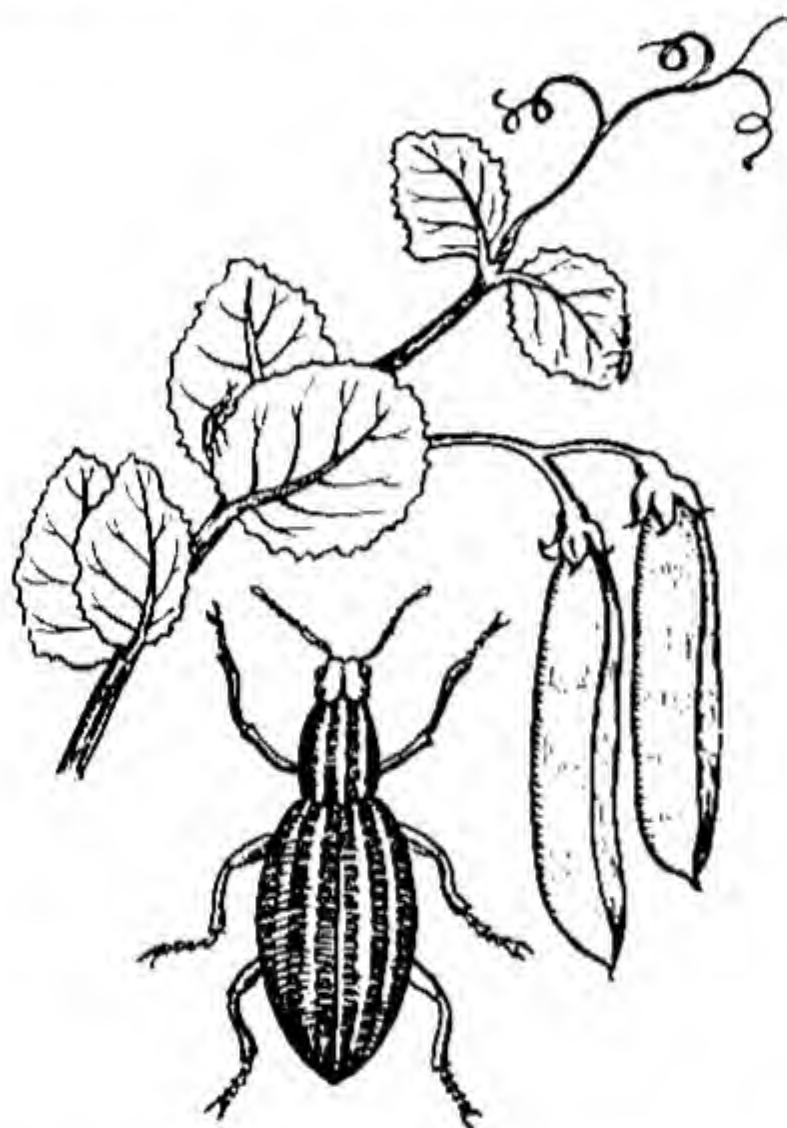
of making a very durable path which is quite pleasant to walk on. If used, the surface layer of asphalt should be about one inch in thickness.

Gravel Gravel is another material which has to some extent gone out of favour, having once been the most popular of all surfacing materials. No doubt a contributory cause to this is the labour involved in weeding, but this has now been removed by the introduction of improved weedkillers, particularly such substances as sodium chlorate with which gravel paths can be kept quite clean with little labour and complete safety. Loose shingle is very cheap but never makes a really satisfactory surfacing material, as it is very tiring to walk on and must be frequently raked to keep it level. Gravel should contain sufficient sand to enable it to bind together into a smooth and firm surface. Once again it is necessary to insist on the importance of a good foundation layer of hard material. On this the gravel should be spread at least 3 inches thick, and for preference with a slight camber or fall towards the edges so that water runs off readily. Rake the gravel to a smooth, even surface and then roll it thoroughly, watering it occasionally while this is being done so that it becomes really compact and hard. A well-made gravel path should require little after-care beyond weeding. If it does become loose or worn, the holes should be patched with more gravel, and rolling and watering repeated as in the first instance.

PEA AND BEAN BEETLE The small white grub of this beetle attacks the seeds of broad beans and peas, eating small holes in them. No satisfactory remedy has been discovered but as a rule no vital injury is done to the seeds, which germinate despite the holes. Most modern seed-cleaning stores are provided with ingenious machines for removing the seeds damaged by these beetles.

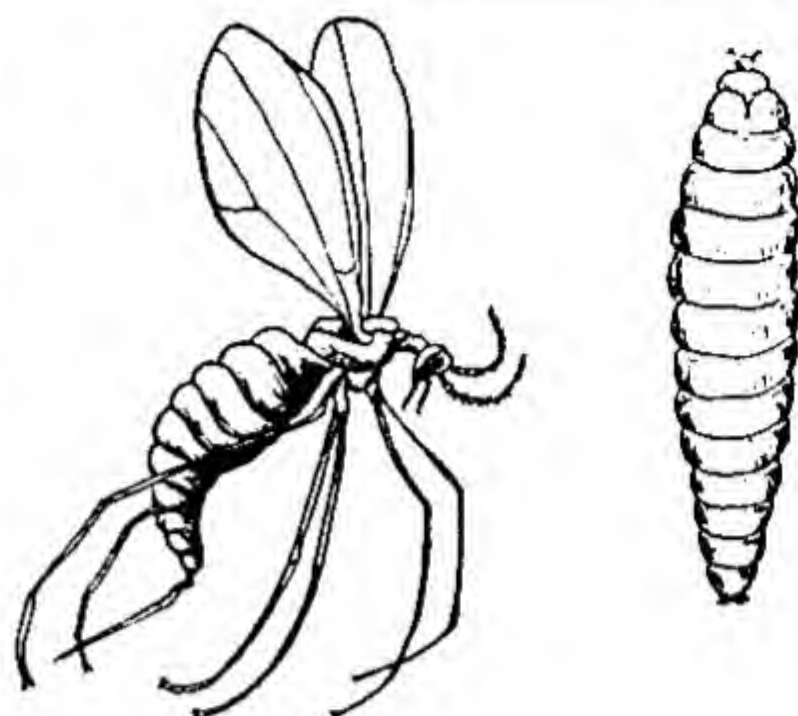
PEA WEEVIL This pest, also known as pea and bean weevil, attacks the leaves of peas and broad beans. It eats the margins of the leaves so that they have a scalloped appearance. Two separate species of weevil

produce similar damage. Both are greyish in colour and about $\frac{1}{4}$ inch in length, but there is no need for the gardener to be able to distinguish between one and the other as the remedy is the same for both. Damage is most likely to be severe in late spring and early summer. Complete control can be obtained by dusting the foliage with DDT or gamma-BHC insecticide.



Pea weevil

PEAR MIDGE The small, yellowish-white maggots of this insect enter the fruitlets of pears and feed within them; as a result the fruitlets become deformed, turn black and fall prematurely. The female midges lay their eggs in the flowers during the spring, and the best remedy is to spray with a nicotine insecticide, preferably with the addition of soft soap or a commercial spreader, when the blossom is fully open. Unfortunately this treatment may kill some bees engaged in collecting nectar and pollen. Another remedy is to spray the surface of the soil below trees with DNC winter wash between the bud-burst and white-bud stages. The spray should be used at low pressure at about 1 gallon to 4 square



Pear midge

yards. Frequent surface cultivation in June and July will help to eliminate this pest.

PEAT Organic matter in an arrested state of decay. Peat is most likely to be formed from deposits of vegetation which has grown on heathland or in some boggy areas. Peat varies greatly in both its origin and its character, and while some peat is of great value to the gardener as a source of humus, other samples are useless, as they are far too acid, or they contain substances which are injurious to plants. Good grade peat has to a considerable extent replaced leaf mould as a source of humus in potting composts, partly because it is relatively free of spores of fungi and of other organisms which may cause disease, and also of weed seeds, but even more because it decays more slowly than leaf mould and therefore retains its nature in the soil for a longer period. The best peat for this purpose is that from deposits of sphagnum moss, but any fibrous peat which is not too dusty in texture, and not too acid, may be employed. In the well-known John Innes potting compost,

sphagnum peat is one of the recommended ingredients.

For outdoor use, to improve soils lacking in humus, a wider range of peats can be used without harmful effects. However, it is wise to avoid those which are of a very dusty nature, as these will tend to clog up the soil rather than improve its texture. If peats of a very acid nature are used, it is often desirable to give a dressing of lime at the same time, to counteract this acidity. For outdoor use, peat can be employed in the same way as leaf mould at the rate of about a barrowload to 6-12 square yards. Finely-broken peat is also a useful top dressing for shrub borders, lawns and even for vegetable crops, to protect the surface soil from the heat of the sun and encourage the moist, cool conditions in which roots thrive. Some plants, notably members of the heather family (*Ericaceae*), delight in peaty soils. When these are grown in places in which the soil is not naturally of this type, it may pay to import considerable quantities of peat, both for forking into the soil prior to planting and for use subsequently as top dressings. As these plants also like acid conditions, it will not, as a rule, matter if the peat is somewhat acid.

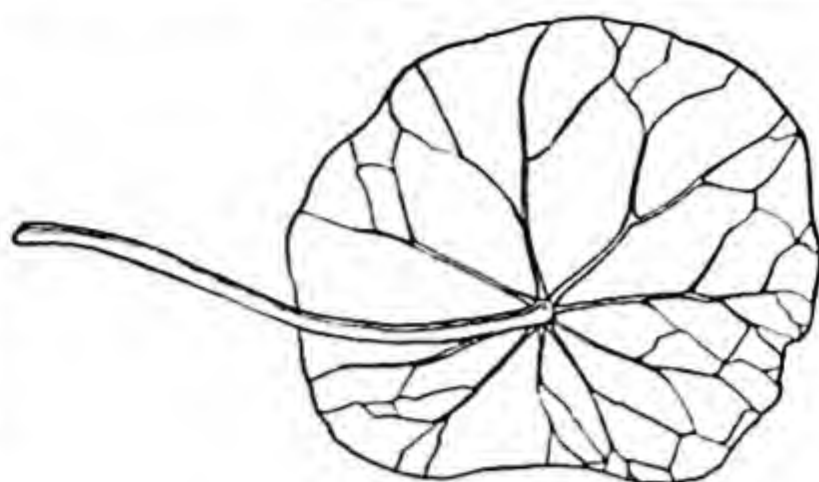
It is customary to dry peat thoroughly before it is made up in bales or bags for sale, as dry peat weighs considerably less than wet peat. In this condition, however, it is rather difficult to make it absorb moisture, so before dry peat is used, whether in potting composts or for digging into the soil, it should be spread out and thoroughly moistened.

PEDICEL The stalk of a single flower.

PEDICEL NECROSIS A somewhat unwieldy name given to the trouble described under the heading *Bud Disease*.

PEDUNCLE The stalk of a cluster of flowers or of a single flower. See *Pedicel*.

PELTATE A botanical term used to describe leaves in which the stalk is attached within the leaf margin, as in the common nasturtium (*Tropaeolum majus*).



A peltate leaf

PEPPER DUST Ordinary pepper dust as used in the kitchen is useful in the garden as a deterrent to earwigs and cats. For other purposes the pepper dust should be sprinkled lightly over the leaves or flowers of plants that are liable to be damaged.

PERCH, see *Rod*.

PERIANTH That part of a flower which is composed of the calyx and corolla.

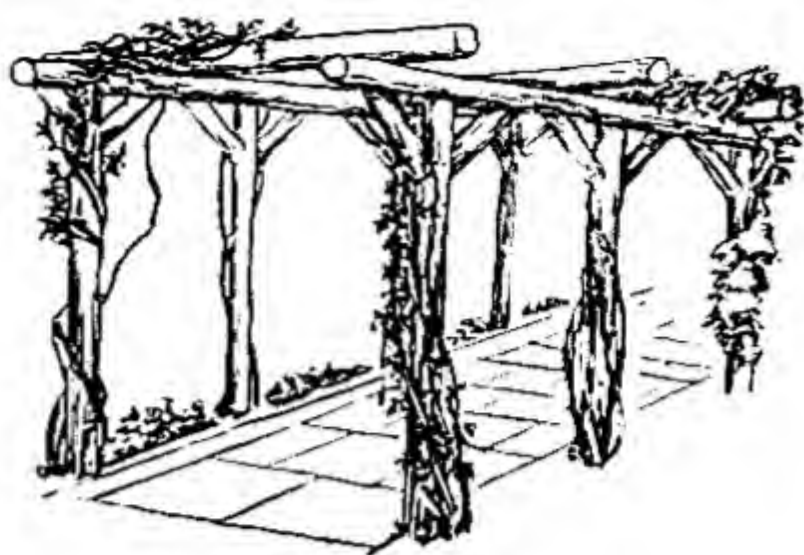
PERENNIAL Any plant that continues to live for an indefinite number of years and to flower time and again. Such a plant may be contrasted with an annual which completes the cycle of its growth in one year and dies after it has flowered and produced seed, a biennial which has a similar life cycle but takes two years to complete it, and a monocarpic plant which may live for several years, but flowers only once and then seeds and dies. It is wrong to regard a perennial as a plant which goes on living for ever. There will come a time in the life of every plant when it will die of old age, but this period will not only vary greatly from one species of plant to another, but also from one individual to another within the same species. There are, for example, short-lived perennials such as lupins, which rarely live for more than 5 or 6 years, in contrast to long-lived perennials, such as peonies, which may continue in good health for a great many years. A tree or shrub is as much a perennial as a herbaceous plant if it fulfils the qualifications in the first paragraph. In show schedules the term 'perennial' is sometimes wrongly used for 'herbaceous perennial'. For example in a class for 'Six vases of perennials' an ex-

hibitor would be quite justified in staging cut stems from trees and shrubs. If it is intended that such a class is to be confined to herbaceous perennials the word 'herbaceous' must be used. Moreover the term 'perennial' refers to the natural character of the plant. A perennial from a tropical or sub-tropical habitat does not cease to be a perennial because, when grown in a colder climate, it is killed each winter. In this respect, also, show schedules are sometimes badly worded. In a class for 'Six vases of herbaceous perennials' an exhibitor would be quite justified in including dahlias. If such half-hardy plants are to be excluded the word 'hardy' should be used.

PERFOLIATE Penetrating the leaf. A botanical term applied to stems which are apparently completely encircled by the leaf.

PERGOLA A series of arches forming a covered walk. Pergolas are of many different kinds and can be made of many different materials. Simple pergolas are made of wood, either undressed poles such as those of larch or pine, or squared and treated timber. More elaborate constructions may have pillars of stone or brick with wooden cross-members. They can be of any dimensions, but if they are to be covered with climbing plants, care should be taken to see that there is enough head room to allow for the normal growth of plants and still leave room for a person of ordinary height to walk comfortably beneath; e.g. wisterias are often planted to cover pergolas and look very beautiful when grown in this manner, but the builder must recollect that when the wisteria is in flower, the trails of bloom will hang 2 feet or more below the roof members of the pergola. In consequence, it will be necessary to build a pergola something like 8 feet in height to accommodate in comfort plants of this type.

A bare pergola presents little resistance to wind, but when it is covered with plants, the resistance will be greatly increased and, unless it is of substantial construction, it may easily be blown down. Wooden uprights should be of stout timbers, sunk two



A pergola

feet or more into the soil, and brick or stone piers should be well cemented.

PERMANGANATE OF POTASH The popular name for potassium permanganate, a chemical which is sometimes used by the gardener as an insecticide and fungicide and also as a moss killer. For the first two purposes it has been superseded, to a very large extent, by other and more powerful chemicals. Nevertheless a ring of permanganate of potash closely placed round a choice plant will provide a very effective defence against slugs, and if it is believed that slugs are hiding under the carpet formed by spreading plants such as pinks and alpine phlox, it is quite safe to water these thoroughly with a deep pink solution of permanganate of potash, which will destroy the slugs or drive them away. A deep pink solution of permanganate of potash is also sometimes used to check damping off disease in seedlings, though Cheshunt compound does this more effectively. It is, perhaps, as a moss killer that permanganate of potash is most serviceable to the gardener. For this purpose a stronger solution should be used—dark red rather than pink—and this should be sprinkled freely over the patches of moss from an ordinary watering can fitted with a fine rose. The remedy can be repeated several times at intervals of a week or so, if necessary, until the moss is completely destroyed. It can also be used to treat newly built concrete pools to remove unwanted chemical elements (see *Pools*).

PERPETUAL This term is used to de-

scribe certain plants which continue to bloom more or less continually for a long period. Thus the perpetual flowering carnation can be had in bloom at almost any time of the year, provided an adequate temperature is provided. Perpetual flowering races of pinks, have been raised by crossing varieties of *Dianthus plumarius* with perpetual-flowering carnations, and the race known as *Allwoodii* is a notable example of this. The hybrid perpetual rose was so named because it was supposed to be more perpetual-flowering than many varieties which had preceded it in the garden. It was, however, nothing like so perpetual-flowering as some roses which have been developed later, for example the hybrid teas and in this instance the word perpetual is somewhat misleading.

PERUVIAN GUANO A natural deposit left by sea birds on some parts of the coast of Peru and other areas of South America. See *Guano*.

PEST A very loose term used in the garden to describe any member of the animal kingdom which may damage plants. Thus there are many insects which are garden pests and also many other small creatures which do not belong to the insect family, as for example, woodlice, millipedes, slugs and snails. The term may also be used to cover mice, rats and even some destructive kinds of birds. It is often used in contrast to the word diseases—another all-embracing term used to cover all plant ailments caused by members of the vegetable kingdom, including fungi and bacteria.

PETAL One of the separate leaves of the corolla of a flower.

PETALOID Resembling a petal; a botanical term used to describe parts of a flower which though not true petals nevertheless resemble petals in many respects. For example some peonies have small, petal-like parts forming a boss in the centre of the flower. These are really modified stamens, not true petals, and such blooms are described as having a petaloid centre.

PETIOLE The botanical term for a leaf-stalk.

PETROLEUM OIL INSECTICIDES

Proprietary insecticides made from petroleum oil. Special winter washes, sometimes containing other substances such as DNC (*q.v.*) or thiocyanate (*q.v.*), to render them more effective, are applied to fruit trees in late winter for the purpose of destroying insects and insect eggs. They are, therefore, comparable with tar oil washes which are used for a similar purpose, but petroleum oil winter washes differ from these in not controlling sucker and aphids though being more effective against the eggs of moths, and against capsid bugs and red spider. To be more effective these washes should be used as late as it is possible without causing injury to foliage or expanding flower buds, which may be up to the bud-burst stage but not later. In the normal season in the southern half of England, this will mean that spraying may be continued during March and the first week in April. Manufacturer's instructions regarding strength should always be followed where available, the usual recommendation being 3 pints of winter petroleum emulsion to 5 gallons of water. Often lead arsenate is added to this late petroleum spray. A fortnight should elapse before using a lime sulphur wash after petroleum oil or spray injury will result.

Other petroleum oil insecticides are made for summer use while plants are in leaf, and these are effective against capsid bugs and scale insects. Again manufacturer's instructions should be followed where available, the usual recommendation being 6 to 8 fluid ounces of summer petroleum emulsion to 5 gallons of water.

pH, see *Acid*.

PHOSPHATE Any salt of phosphoric acid. It is in this form that phosphorus, an essential plant food, is applied in the garden. As phosphates are used in considerable quantity by plants, and in some instances are easily washed out of the soil, it is often necessary to give regular supplies. Natural manures, such as dung and com-

post, contain phosphates, but the percentage is always small and will differ considerably from one sample to another. The bones of animals are particularly rich in phosphates and provide valuable sources of this food if ground finely. In this instance the food is only liberated comparatively slowly, though the speed of liberation will be proportional to the fineness with which the bones are ground; the finer the bone meal the better, from this point of view. Other sources of phosphate are basic slag, superphosphate of lime, and the natural deposits of mineral phosphate (or phosphate of lime) which occur in North Africa and some other places. These are described more fully under their respective names.

PHOSPHATE OF LIME A term sometimes used for crude mineral phosphates such as those obtained from natural deposits in North Africa, and sometimes incorrectly as a synonym for superphosphate of lime.

PHOSPHATE OF POTASH A chemical salt of phosphoric acid and potassium. It provides two necessary plant foods, phosphate and potash, but unfortunately it is too expensive for general use. It is, however, sometimes used for valuable pot plants, particularly where rapid stimulation is required. Phosphate of potash contains 51 per cent. phosphoric acid and 35 per cent. potash. It is usually applied as a liquid fertilizer at the rate of $\frac{1}{4}$ ounce to a gallon of water, given in moderate quantities in place of ordinary water and repeated if necessary, every 10 to 14 days.

PHOSPHORUS PASTE A poisonous chemical sometimes used for the destruction of mice and rats. These rodents will often eat phosphorus paste without the added attraction of a bait, but it is better to spread it on pieces of bread, cheese, fish or fat. It is ready for use as purchased. As it is poisonous to warm-blooded animals it should not be placed where dogs, cats or other domestic pets may pick it up.

PHOTOPERIODISM The effect of light in controlling the flowering time of plants. Broadly speaking plants may be classified

in this respect under three headings, long-day plants, which will only flower when there are 14 hours or more of daylight each day; short-day plants, which will only flower when there are 10 hours or less of daylight each day; and indeterminate plants, the flowering of which is not affected by the day length. Many summer flowering annuals, such as stocks, clarkia and larkspur, also gladioli and strawberries, are normally long-day plants. Chrysanthemums and dahlias are normally short-day plants. It is possible in some instances to break this natural habit by selective breeding, and plants may also be made to flower out of season or be prevented from flowering, in season by artificial illumination or darkening.

PHOTOSYNTHESIS The process whereby green plants make use of the energy of sunlight to convert simple chemicals into complex carbohydrates and proteins. Photosynthesis depends upon the green colouring matter or chlorophyll found in the leaves and often also in the younger stems.

PHYTOPHTHORA The name of a group of fungi one of which causes the familiar potato blight disease and another the damping off that occurs in seedlings. For fuller particulars see *Potato Blight* and *Damping off*.

PIGEON MANURE Chemically this is one of the richest of all natural animal droppings commonly used by gardeners for the feeding of the soil. Pigeon manure may be compared in manurial value with good Peruvian guano (see page 114). Because of its concentrated nature, it can easily cause scorching of roots and foliage if used in excess, and may be regarded as a concentrated fertilizer rather than as an ordinary animal manure. The usual method of use is to allow it to dry in an open shed or similar place and then to powder it and mix it with at least twice its own bulk of dry sand or soil. This mixture can then be used as a light top-dressing round plants in growth. Plain, dry pigeon manure should not be used at rates exceeding 6 ounces per square yard at any one application.

PIG MANURE This is, as a rule, less rich in plant food than either horse or cow manure and it is also wetter and closer in texture than either of these. For the two last reasons it is less suitable for use in the heavier types of soil, but is more suitable for the improvement of very light, sandy soils. Pig manure appears to have got a bad name amongst many gardeners but there is no sound reason why this should be so if it is properly used. It can be applied at the rate of 1 hundredweight to 6-12 square yards at any time of the year and, like other animal manures, it is particularly suitable for autumn or late winter application. It is a valuable source of humus. Fresh pig manure should only be used on vacant ground that is not to be cropped for several months. Pig manure that is to be used as a mulch round growing crops, or is to be dug in on ground that is to be cropped immediately, should be well rotted.

PILOSE A botanical term used to describe leaves or stems which have long, soft hairs.

PINCHING A term used to describe the removal of the tips of growing shoots (see *Stopping*).



Pinching a chrysanthemum shoot

PINK BUD, see *Bud Stages*.

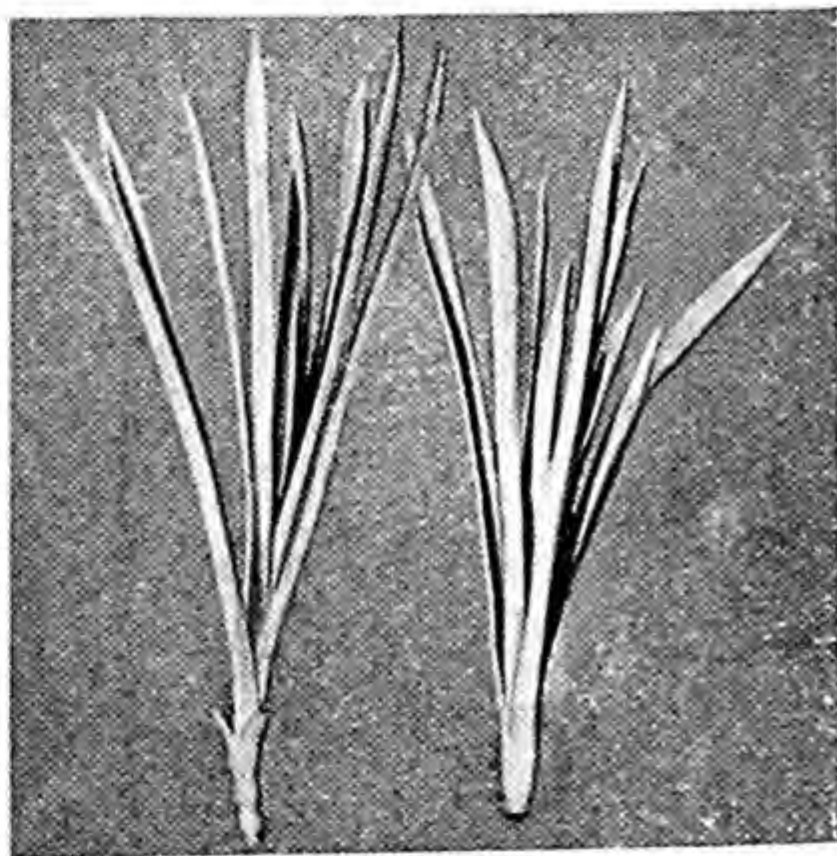
PINNATE Like a feather; a botanical term used to describe leaves which are composed of several leaflets attached on either side of a common stalk as in the rose.



Pinnate

PINNATIFID A botanical term used to describe leaves which are notched or cut in a pinnate manner, but are not actually composed of separate leaflets. Pinnatisect has the same meaning.

PIPING A particular kind of cutting which are sometimes used for propagating pinks and other members of the dianthus family. Pippings are obtained by pulling a young shoot out at one of the joints. No knife or other tool is used. The shoot is simply grasped between finger and thumb, just above a joint, while the stem below the joint is held firmly with the other hand. A steady pull will then bring the shoot cleanly away, and it is ready for insertion without



Pippings of pinks

any further preparation. Pippings are usually made from young non-flowering shoots and are taken in early summer. They are treated in exactly the same way as cuttings.

PISTILLATE Having pistils but no stamens. A botanical term applied to flowers which have the female organs only.

PIT An old name for a certain type of frame which has almost gone out of use. Pits were rather deep frames in which the floor was sunk below ground level and the frame light was at, or only just above soil level. They were often used for forcing, the advantage of the pit construction being that warmth was more easily conserved, and the frame was less exposed to wind.

PIT ROT Another name for the dry rot disease of potatoes. See *Dry Rot*.

PLANTING The manner in which plants are placed in soil when they are shifted from one place to another can have a very important bearing upon their welfare. There are three vital points to observe in all planting. The first is to work only when

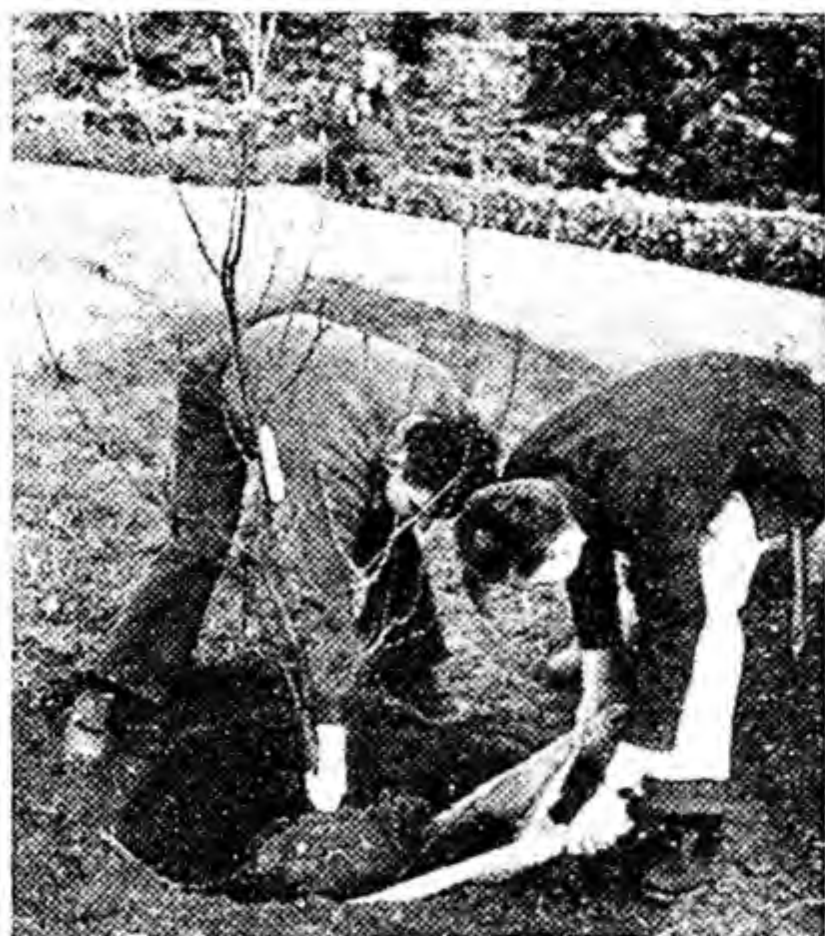
the soil is in suitable physical condition—which means when it is neither too wet nor too dry; the second is to plant at the correct depth so that the roots are neither buried too deeply nor exposed on the surface of the soil; the third point is to plant firmly, and this applies to almost all types of plants though there are some variations in this respect, and a few plants, notably ferns, prefer a moderately loose soil.

The soil may be regarded as too wet for planting when it sticks freely to boots, spade or trowel. It is usually too dry if there is no sign of moisture in the top two or three inches. The ideal is that it should be just moist enough to cling together when squeezed in the palm of the hand, but dry enough for the ball so formed to fall apart freely when tossed back on to the ground. As the season for transplanting is often comparatively short, it may often happen that work has to be continued under less favourable conditions than these, but the nearer the one can get to the ideal, the better. It is always better to wait a week or so than to plant in really unsuitable conditions.

As regards depth of planting, this will vary according to the nature of the plant under consideration. Some plants make



Planting shrubs: preparing the hole



Planting: placing the shrub in position

most of their roots near the surface, e.g. tomatoes and privet (*ligustrum*); others plunge their roots much more deeply into the soil, e.g. roses worked on the canina stock and lupins. The safest guide is to ascertain the depth to which the plant was

growing before it was lifted. Frequently there is a soil mark on the stem of a shrub or tree, which will give this information quite accurately. With herbaceous plants one can usually be fairly certain that the crown, i.e. the point at which stems join roots, was level with the surface of the soil or at most only very slightly buried beneath it.

There is a frequent tendency to prepare holes which are too deep in proportion to their width. A few plants, such as lupins, sea hollies, globe thistles and hollyhocks, plunge their roots more or less perpendicularly into the soil, but most spread them



Planting: firming a young plant with the dibber

out horizontally or nearly so, and must be allowed to do the same when they are transplanted. This means that, in general, holes must be considerably wider than they are deep; even for a fruit tree three or four years of age a hole one foot deep is usually adequate, though it may need to be 3 or 4 feet in diameter. If narrow holes are prepared and the ends of roots are doubled up in order to accommodate them in these, it will almost always be found, if the plants are examined a few months later, that the root ends have died.

When plants are purchased in (or tapped out of) pots, it will usually be found that the roots are coiled round and round in a more or less tight ball. If possible this ball should be carefully loosened and some of the roots unravelled a little so that they



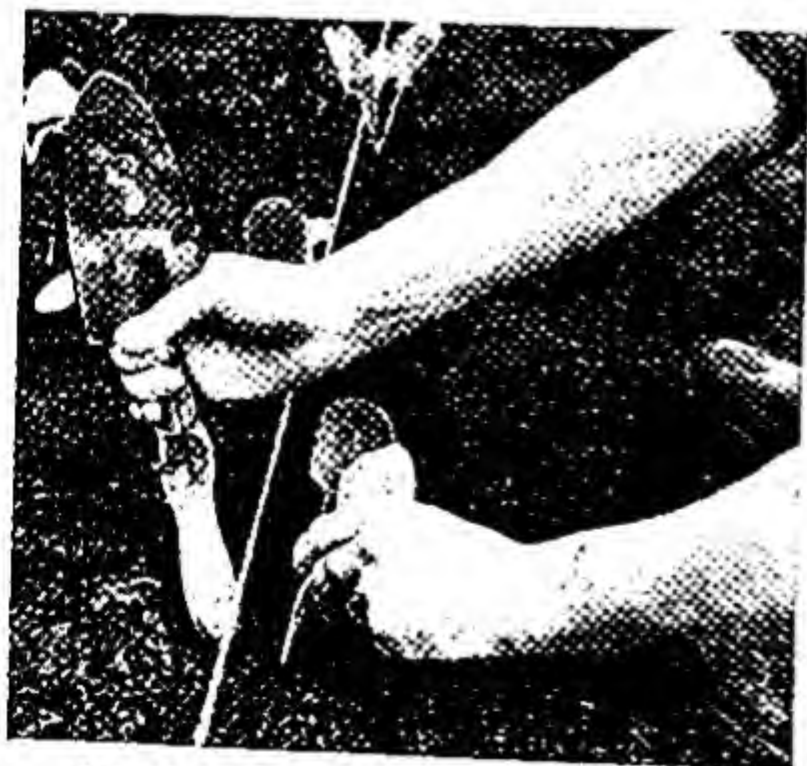
Planting: firming the soil while filling in



Planting: the use of a trowel

may be spread out in the surrounding soil. If left in a tight mass, it may be months or years before they grow out in a natural manner.

The best tools for planting are the trowel and spade, the former for fairly small plants and the latter for those requiring a hole too large to be dug conveniently with a trowel. The dibber, though it enables work to be done very quickly, is not a satisfactory tool except for small seedlings and plants with tap roots, such as brassicas. The reasons for this are that the hole made by the dibber is too deep in proportion to its width, that the roots tend to be cramped or doubled up



Planting: firming with the trowel handle

in consequence, and that the soil round the edge of the dibber hole tends to become too consolidated. Though roots need to be made firm, the soil should be evenly firm throughout and this is an aim not easy to attain when planting with a dibber.

When planting with a spade, it is an advantage if two persons can work together, one holding the plant in position in the centre of the prepared hole and the other returning the finer soil a little at a time. Meanwhile the plant should be gently jerked up and down so that the soil is settled thoroughly between and around the roots.

Firming of all except the smallest plants should be done with the foot, and can hardly be too thorough in the case of big plants, particularly shrubs and trees. Start to firm as soon as the topmost roots have been covered and then add some more soil, firm again, and finally give a scattering of loose soil on top to give a neat appearance and prevent puddling on the surface. Small plants can be firmed by pressing the knuckles of both hands on either side of a plant. Soil should be pressed downwards and at the same time a little towards the plant. When planting with a dibber, firming should be done by thrusting in the dibber a second time, an inch or so away from the first hole, and then levering it towards the plant.

Given sufficient care, there is practically no time of the year in which planting cannot be carried out. Nevertheless there are some seasons when the risk is very much less than at others. In general it may be stated that herbaceous plants can be planted most satisfactorily in spring or early autumn; that deciduous trees and shrubs move best from mid-October to the end of March, a season which also suits evergreen conifers, but that some broad-leaved evergreens transplant more satisfactorily in early autumn or in spring. Bulbs are usually planted while dormant which is generally in late summer or autumn.

PLUMOSE Plumed or feathery; a botanical term used in the description of flower or seed parts which are of this form.

PLUNGE BED A bed in which pot-grown plants are placed with the pots sunk to their rims to protect the soil and roots within from the ill effects of rapid drying-out and sudden changes of temperature. Sharp, sifted boiler ashes, coarse sand and peat are the materials most commonly used for this purpose. Often the bed is made up above ground level with boards on edge around it to keep the plunging material in position. Where overhead protection is also required the plunge bed is made in a frame. A special use of the plunge bed is to allow bulbs intended for indoor cultivation to form plenty of roots before they are forced in any way. For this purpose the plunge bed is usually made in a shady place and the pots, bowls or boxes are completely covered to a depth of several inches.

POLE, see *Rod*.

POLLARD A name given to any tree which has been repeatedly pruned very severely, in other words has been polled or lopped. The term pollarding has been used to describe the process of lopping such a tree. Pollarding is sometimes practised for purely utilitarian purposes, as with pollard willows, which are cut back to encourage strong growth of young shoots or 'withies' which are used for a variety of purposes, including basket-making. It is a usual result of any hard pruning that strong young growth will result.

POLLEN BEETLE A very small black beetle, not unlike the flea beetle, which lives on pollen and may be found on many different kinds of flower. As a rule pollen beetles do little damage from the gardener's point of view, but if a seed crop is being grown and the infestation of pollen beetles becomes too great, so much pollen may be destroyed that imperfect fertilization may result. The remedy for this beetle is to spray or dust occasionally with DDT which is applied as soon as the beetle is seen.

POLLINATION The act of transferring pollen from the anthers to the pistil of either the same flower or another flower with the object of causing fertilization (*q.v.*). Pollina-

tion may be encouraged by jarring plants while in bloom, by dusting their flowers lightly with a camel's hair brush or rabbit's tail tied to a stick, or sometimes by syringing them with water.

POLYPLOID A plant with more than the usual number of chromosomes characteristic of the species to which it belongs. Both triploids and tetraploids are particular types of polyploid, but the name is usually reserved for higher multiplications of the basic chromosome number or for plants with odd numbers of chromosomes.

POME A botanical term used to describe the fruits of apples and other members of the genus *malus*.

POOL A pool or pond can add greatly to the attraction of the garden and at the same time considerably widen the range of plants that can be grown. Water has the merits, from the garden designer's point of view, of providing a totally different type of surface from that of any other feature in the garden and of enabling the designer to exploit the artistic possibilities of reflections. A great deal of ingenuity can be displayed in using both these features of water to the the best effect.

Pools and ponds may be either formal in character or informal. In the first instance the shape of the pool will usually be of some fairly simple geometrical form, such as a square, rectangle, circle or oval, though occasionally more elaborate designs are adopted. Informal pools, by contrast, will usually have an irregular outline and will be made to look as natural as possible—as if, in fact, the pool had formed part of the site before it was made into a garden.

When building formal pools, it is almost invariably the practice to line the interior with an impervious layer of concrete. This is now also the usual practice with informal pools though at one time these were occasionally made of beaten clay. The advantages of concrete are that it is much more permanent than clay, that, if properly prepared, there is much less danger of leakage, and that the ingredients are readily obtainable in almost all districts.

Concrete for pools should always contain some waterproofing substance. There are various proprietary preparations on the market for this purpose, some of them powders, some liquids, and any builder's merchant can supply them. These preparations should be used strictly in accordance with manufacturer's instructions and no general advice can be given on this matter, as this will vary from one brand to another. For the concrete itself, however, precise instructions can be given. The best ingredients are 3 parts by bulk coarse aggregate (ballast), 2 parts builder's sand and 1 part cement. These ingredients must be mixed thoroughly, which means that they must be turned several times on a hard floor. Then they should be turned again while water is added a little at a time, this process being continued until the whole mass becomes plastic and is of about the consistency of moderately stiff porridge. Meanwhile the waterproofing agent should have been added at the appropriate stage as indicated by the manufacturers.

This concrete should be spread to a depth of at least 3 inches over the bottom and sides of the pool. It is better if this thickness can be increased, as this will make the pool both more durable and more waterproof. As much as possible of the pool should be covered with concrete at one time, as there is always a certain danger that if the work has to be done by stages, leaks may develop where successive mixings of concrete join. If, however, it is impossible to complete the work at one time, one lot of concrete should be allowed to become firm before another is placed upon it. Moreover before a further lot of concrete is put down, the edge of the preceding lot should be thoroughly moistened, as this will enable the new concrete to make a better join with it.

All concrete should be thoroughly firmed with a smooth wooden block, which may have a handle fitted to it for convenience. Concrete for pool-making should always be allowed to dry very slowly and to ensure this it should be covered with damp sacks which may be allowed to remain for a week or 10 days. In warm summer weather it will be desirable to wet these sacks at least

once a day. In all except the smallest pools, it is also an advantage to reinforce the concrete by placing expanded metal, iron rods, or wire netting in it. This reinforcing material should be well embedded in the concrete, and no part of it should appear on the surface when the concreting is finished.

The overall dimensions of pools will, of course, vary greatly according to the requirements of the garden designer, but the best depth can be stated with greater precision. Few water-lilies or other aquatics thrive in water deeper than 3 feet, and 2 feet is adequate for most kinds. Many of the plants commonly found at the sides of streams and rivers do not like to be covered with more than 2 or 3 inches of water. In consequence it is a very general practice to make pools about 2 feet deep in the centre and then either to build a shelf round the edge so that some plants can be accommodated in shallow water, or to slope the bottom upwards towards the sides. This latter method is often followed with informal pools and is particularly suitable for them as it is the natural formation of most ponds and lakes. For formal pools, however, shelf construction is to be preferred. The top of the shelf should be about 9 inches to 1 foot below the prepared water level of the finished pool so that 6 or 7 inches depth of soil may be spread on it, and yet leave a few inches of water above the crowns of the plants.

When pools are built with sloping sides, the concrete can be spread over this in the same way in which it is spread over the bottom, i.e. first roughly with a shovel and then firmed and smoothed down with a wooden block. When vertical or nearly vertical sides are adopted, shuttering must be used to hold the concrete in position while it is drying. This shuttering can be made of any boards nailed to a suitable framework. The interior faces of the boards should first be greased to prevent the concrete from sticking to them.

Formal pools are generally finished off with some kind of coping. This may be of stone paving slabs, crazy paving, concrete or brick. Whatever material is used it should be firmly cemented in position, and

as a rule it is allowed to overhang the edge of the pool by an inch or so.

When pools are lined with concrete, it is necessary to treat them in some way before they are finally filled with water and stocked with plants and fish. This is because freshly-made concrete contains certain chemicals which will be slowly dissolved by the water, and may prove harmful to plants and fish. One method is to paint the whole interior of the pool with one or other of the bituminous compounds advertised for the purpose. These have the effect of completely preventing the water from touching the concrete and, incidentally, they serve as a further waterproofing precaution, for they will fill up any small holes or imperfections left in the making. A similar result may be obtained by painting the interior of the pool with sodium silicate, which is usually sold by chemists as 'waterglass' for the purpose of preserving eggs. This waterglass should be diluted with just sufficient water to enable it to be spread fairly freely with an ordinary paint brush, and then the interior of the pool should be given two or three coats. The advantage of waterglass is that it is transparent and, therefore, does not in any way alter the appearance of the pool whereas the bituminous products are often black and always coloured in some way, which may be undesirable.

A further alternative is to treat concrete chemically to remove unwanted elements. This can be done by filling with water and then adding permanganate of potash crystals until the water is coloured wine-red. This should be left for a week, after which the water should be syphoned off and the pool can then be filled and stocked in the ordinary way.

The best time for planting pools is in spring, particularly in late April and early May. The best soil in which to grow aquatics is a rather stiff loam, and it is not desirable to add any dung or other manure to this, as it will only foul the water. The loam may be spread all over the bottom of the pool, and also on any ledges, to a depth of at least 6 inches or, if preferred, may be kept in small beds formed on the bottom of the pool by placing bricks on edge in the concrete while it is still moist. In either case it

is desirable to cover the loam with a thin layer of clean, washed gravel, to prevent the water from becoming unduly muddy. The planting of aquatics is dealt with under the heading of *Aquatics*.

In winter small pools may become so thickly frozen that all plants and fish in them are killed. Even a comparatively thin covering of ice, if allowed to remain for many weeks, may result in the death of fish from suffocation. To prevent this danger, small pools should be covered with boards, sheets of corrugated asbestos or some similar material, whenever the weather threatens to be particularly cold, and sacks or straw should be thrown on top as an additional precaution. Moreover, any film of ice which forms should be broken occasionally to admit air to the water.

POTASH A term rather loosely applied by gardeners to indicate various substances containing potassium. The original application of the word seems to have been to carbonate of potassium, which is the salt of potassium formed when wood is burned, and it was named after the pots or vessels in which it was originally made. When the 'potash' content of a manure or fertilizer is stated, it is always in terms of potassium oxide (K_2O). Manures and fertilizers containing potassium in some form are valuable because this is an essential plant food, and one which has considerable influence upon fruitfulness and maturity. In the absence of adequate potassium, plants may make excessively soft growth and fail to produce flowers or fruit. Severe scorching of leaves, particularly of leaf margins, is also a frequent result of potash deficiency in the soil.

The forms in which potash is most commonly applied to the soil are sulphate of potash (48 per cent. K_2O), muriate of potash (50 per cent. K_2O); various natural salts, of which the most familiar is known as kainit, and which may vary considerably in their K_2O contents from as little as 14 per cent. to as much as 20 per cent.; and wood ashes containing varying percentages of potash from about 2 per cent. to 7 per cent. according to the kind of wood, rate of burning, and the way in which the ashes

have been stored. There is also some potash (perhaps $\frac{1}{4}$ to 1 per cent.) in most bulky organic manures, including dung. Seaweed is particularly rich, some samples containing as much as 1 per cent. of potash.

POTASSIUM CYANIDE Popularly known as prussic acid, this is a very powerful poison which was once commonly used in gardens, particularly for fumigating greenhouses and destroying wasps' nests. For both purposes it has been entirely replaced by calcium cyanide which, though equally poisonous, is easier and safer to use.

POTASSIUM NITRATE This is better known as saltpetre, the substance used for making touchpaper and an ingredient of old-fashioned gunpowder. It is too expensive for widespread use as a fertilizer but as it contains both nitrogen and potash in readily available forms, it is a useful food for special purposes. It makes a first-rate liquid manure, used at the rate of $\frac{1}{2}$ oz. per gallon. Dry it can be applied at rates up to 2 oz. per sq. yd. The analysis is nitrogen $12\frac{1}{2}$ per cent., potash 40 per cent. It must not be confused with Chilean potash nitrate, which is quite a different substance with, on the average, a much lower potassic content.

POTASSIUM PERMANGANATE, see *Permanganate of Potash*.

POTASSIUM SULPHIDE, see *Sulphide of Potassium*.

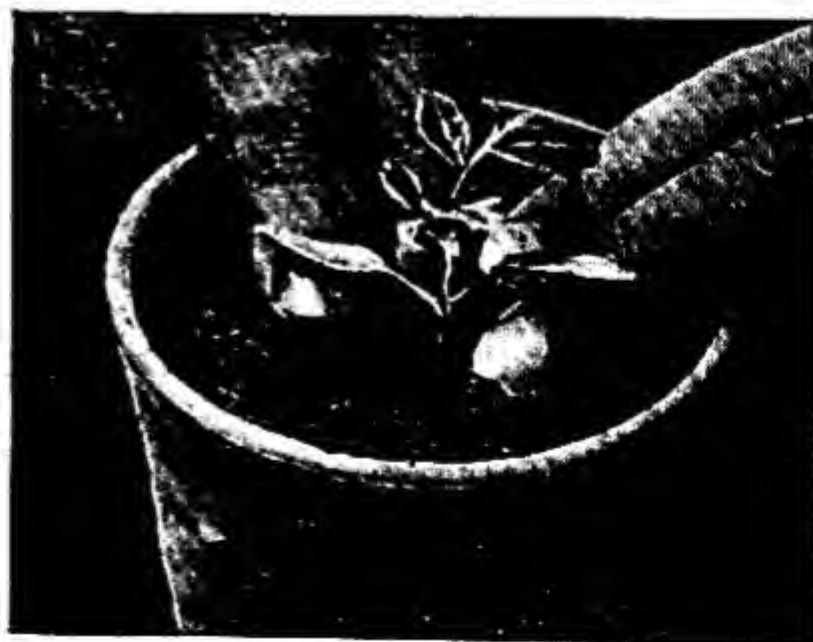
POTATO CLAMP A method of storing potatoes by placing them in a heap and covering them with straw and soil. (See *Clamp*.)

POTTING The process of placing plants in pots or of removing them from one pot to another. Potting is a very important operation in the cultivation of almost all indoor plants, and also enters into the cultivation of some plants intended for cultivation outdoors where these have to be raised in a greenhouse or frame. There are three vital things to know about the potting of any plant: (1) when to do it; (2) how to do it,



Potting up a young tomato seedling

and (3) what soil to use. The first will naturally vary according to the nature of the plant and the time at which it makes its growth, though in general it may be said that most potting is done between February and May. It was once supposed that the third point would also vary greatly from one kind of plant to another and there are still many gardeners who prefer to make special soil mixtures for plants with different types of growth, e.g. one kind of mixture for hard-wooded plants such as heaths, and another for vigorous plants of soft growth such as tomatoes, and yet others for plants differing in other characteristics. While there is nothing against this practice, it has been shown that one standard mix-



Potting: firming with the fingers



Second potting: filling in with compost

ture with a few slight modifications can be made to serve for all, or practically all, plants (see *Composts*).

How to pot. The technique of potting will vary somewhat according to the nature of the plant under consideration and also according to its age. It is a general rule that hard-wooded plants should be potted more firmly than soft-wooded ones, and that old plants should be potted more firmly than young ones. However, like many other generalizations, this rule must be subject to certain exceptions.

All pots should be clean and well supplied with drainage material. Cleanliness is important because, if the pot is dirty, roots will cling to it and it will be very difficult to remove the plant from the pot at a later date without injuring the roots. By contrast it should be possible to tap a plant from a clean pot with its ball of roots completely intact. Drainage is important because, if the hole or holes in the bottom of a pot become blocked up, surplus water will collect, air will be driven out and, as a result, the soil will become sour. The usual method of draining a pot is to break up some old pots, so producing what the gardener terms 'corks', and placing one fairly large cork, convex side upwards, over the drainage hole in the bottom of the pot. Then some smaller pieces of cork are scattered over the main drainage piece. If the pot is a large one, a handful of the

rough rubble, left in the sieve after sieving the potting compost, is placed on top of the small corks.

Before putting in the plant, first place a little compost loosely in the bottom of the pot. Stand the plant on this and hold it in position with one hand, while, with the other, more soil is trickled round the roots. Fill the pot in this way loosely and, slightly above its rim. Then, grasping the pot in both hands and placing the forefingers of each hand round the stem of the plant to hold it in position, give the plant two or three sharp raps on a firm wooden surface, such as a potting bench, to settle the soil down. Now press the soil further with the fingers, particularly round the edge of the pot. This will probably settle the soil something like an inch below the rim of the pot. Give a further scattering of loose soil on the surface to bring the level to between $\frac{1}{2}$ and $\frac{3}{4}$ inch from the rim, according to the size of the pot, and finish with one more sharp rap on the bench.

This technique will serve for most plants up to and including the 6-inch pot. Above the 6-inch size, particularly with plants which like very firm potting, such as heaths and chrysanthemums, it may be necessary to make use of a potting stick in place of the fingers to firm the soil after the initial settling by rapping. This potting stick can be made out of any smooth wood. A piece of



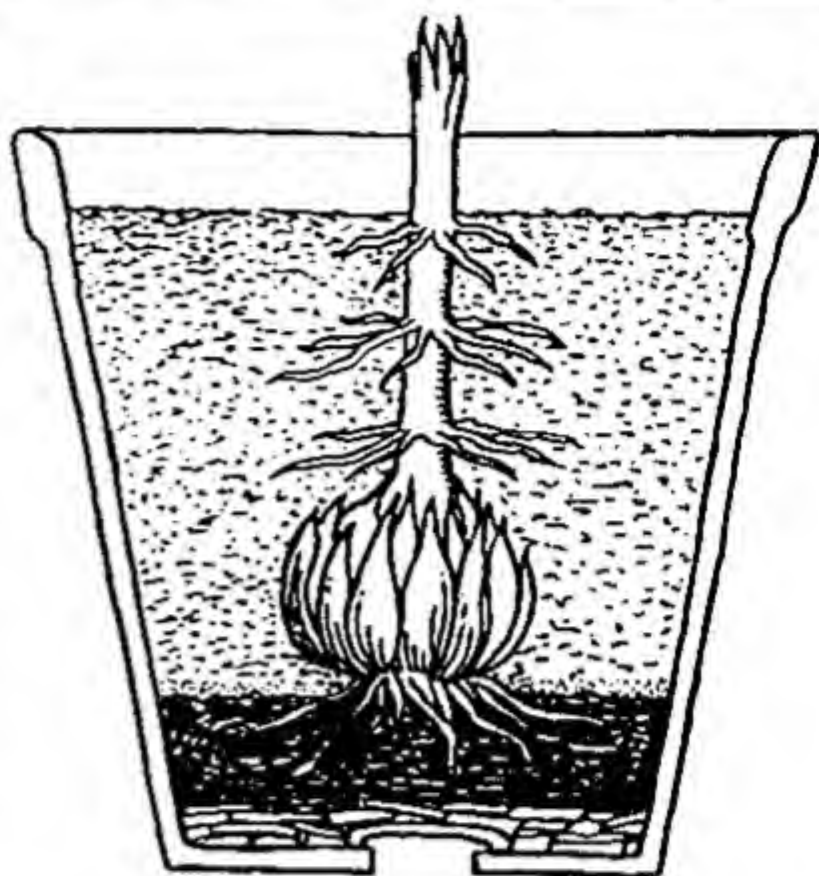
Second potting: firming with a rammer

old broom handle is ideal. The bottom of the stick should be rounded, and it is used as a rammer in one hand to press the soil down round the edge of the pot.

When potting those plants, such as ferns which prefer a rather loose soil, no firming should be done with the fingers, but only by rapping the pot on the bench.

In all this potting it is important to have the soil at the right degree of moisture. If it is too wet it cannot be made sufficiently firm without danger of making it puddle or bake later on. If it is too dry it will be impossible to firm it sufficiently. The right degree of moderate moisture can be gauged by taking a handful of the soil in the hand and squeezing it firmly in the palm. It should be sufficiently moist to bind together into a ball. Now toss this ball lightly back on to the heap. It should be sufficiently dry to fall immediately into separate crumbs.

After potting, most plants will appreciate for a few days slightly moister and more shady conditions than those to which they have been accustomed just before. This will reduce the demand on their roots for moisture and will enable them to recover without undue check or flagging. As soon as the plants have resumed normal growth, the original conditions as regards ventilation, shade and moisture should be resumed.



Potting a stem-rooting lily bulb

POTTING SHED A building in which the potting of plants, and also such operations as seed sowing, pricking out and the preparation of the potting and seed composts, are carried out. Very often the amateur has no room for a separate potting shed and must erect a temporary potting bench in the greenhouse itself. Sometimes it is convenient to combine a potting shed with a tool shed, and where greenhouses are heated by coal- or coke-burning boilers, it is often convenient to have a potting shed attached to one end of the greenhouse with



Potting: knocking a plant out of its pot



An orchid after repotting

the boiler inside the shed so that it is protected from draughts. The potting bench itself should be made of stout wood with boards on edge fixed along back and sides to form a rim which will hold the heap of potting soil. A firm, solidly-constructed bench is essential so that pots may be rapped on it to settle the soil in them.

POTTING SOIL The mixture of soil used for potting; generally termed a compost (see *Composts*).

POULTRY MANURE The droppings from poultry provide a rich animal manure which is considerably higher in its content of plant foods than horse, cow or pig manure, but is of a more pasty texture and, therefore, is not very good for improving the texture of a heavy soil. Poultry manure in excess can cause severe scorching of stems and leaves. Fresh poultry manure is best

applied to vacant ground at rates not exceeding 1 hundredweight to 24 square yards. A better method of using poultry manure is to allow it to dry in a shed, then mix it with twice its own weight of dry soil or sand, and apply this mixture before planting or sowing, or to plants in growth, at rates not exceeding 2 pounds per square yard. The chemical analysis of poultry manure will vary greatly from one sample to another and also according to whether the droppings are fresh or dry. A good sample of wet droppings may contain as much as $2\frac{1}{2}$ per cent. nitrogen, $1\frac{1}{2}$ per cent. phosphoric acid, 1 per cent. potash, while a dry sample of the same manure may contain about three times as much of each plant food.

PREDATORS Insects or other small creatures which attack plant foes and so benefit the gardener or farmer. Familiar examples are the ladybird and its larvae, both of which feed on aphides; the lacewing fly and its larvae and also the larvae of hover flies, all of which attack aphides; the ichneumon flies, the larvae of which live in or on certain caterpillars; the chalcid wasp, the larvae of which attack the scale stage of the white fly; and the black-kneed capsid which attacks red spider mites. Some of these insects are closely allied to plant foes; for example there are other species of capsid bug which do very serious damage to many plants. In consequence of this similarity in structure and habits insecticides applied to plants to kill foes will often kill also the useful insects that prey on these foes. As a result there are occasions when the application of an insecticide may do more harm than good. Accurate timing will often kill the foe while sparing the friend and damage can also be avoided by using systemic insecticides (*q.v.*).

In some instances a foe may be kept down by introducing a suitable parasite. This has been practised on a considerable scale with the chalcid wasp, which has been bred and distributed to greenhouse owners as a means of controlling white fly. In this instance the method of introduction is to hang up in the greenhouse tomato leaves bearing the scales of white fly already para-

sitized by the eggs of the chalcid wasp. In due course the eggs hatch out and the larvae develop into adult chalcid wasps which breed rapidly under favourable conditions, such as are found in a warm greenhouse well stocked with tomatoes which are themselves fairly heavily infested with white fly. The chalcid wasp is unable to survive low temperatures and so cannot be established outdoors in this country.

PRICKING OUT The operation of transferring seedlings from pots, pans, boxes, or beds in which they have been raised, to other receptacles or beds in which they can be given more room. This is a task requiring great care, as in most cases seedlings will still be very small and tender when they are transplanted and it is easy to damage their roots severely or crush their leaves and tender shoots by undue pressure with the fingers. At one time it was recommended that pricking off should always be delayed until the seedlings had at least their first true leaves, as distinct from the seed leaves or cotyledons which are the first to appear. Investigation has shown, however, that less check is inflicted on growth and better plants result if the seedlings are pricked out while still in the seed-leaf stage, and before they have any true leaves.

The soil for pricking out is usually the same as that in which the seeds were germinated, and the John Innes seed compost is a particularly satisfactory mixture for this purpose. If the seedlings are to be pricked out in pots, pans, or boxes, these should be clean, provided with drainage material, and filled with soil to within about half an inch from the rim in the same way as recommended for seed sowing. Moreover the soil should be made fairly firm and level as advised for that operation. If the seedlings are to be pricked out in a bed, the surface of the soil in this should be broken down as finely as possible and, if necessary, the bed should be enriched with a little manure or compound fertilizer. The soil should always be just moist as advised for potting.

The seedlings should be removed from the receptacles or beds with as little injury to the roots as possible. For this purpose a



Pricking out seedlings into a box

sharpened wooden tally is often very serviceable as it can be used like a small trowel to lever the plants up from below. If the seedlings tend to be at all crowded in the seed beds, great care should be taken to separate them out singly. Holes for them are made with a wooden dibber, the thickness of which will vary according to the size of the seedlings being handled, but will average about $\frac{1}{8}$ inch. This dibber should have a rounded end. With one hand the hole is made in the prepared soil, and with the other the seedling is carefully placed in position. The seedling should be held by its seed leaves. See that the hole made is big enough to accommodate the roots without any unnatural doubling up or cramping, then press the soil round the roots with the rounded end of the dibber.

It is usually convenient to prick out the seedlings in straight rows, and to space them evenly in these rows, an average distance being 2 inches each way, though this will, of course, vary somewhat according to the nature of the plant under consideration and the rate at which it grows. When a box or a pot is completed, it should be watered thoroughly, further to settle the soil round the roots of the seedlings, and also to freshen them up after the move. For a few days after pricking out it is usually wise to keep the seedlings in a slightly warmer and damper atmosphere than they have been accustomed to and with less ventilation and more shade from strong sunshine. As soon as they have become established in their new quarters, and begun to grow again

freely, the original conditions should be restored.

For pricking out very small seedlings which it would not be possible to grasp at all easily, use may be made of a small, forked stick to lift the seedling and hold it in position while the hole is being prepared and the roots are being firmed in it.

PROLIFERATION The production of extra flowers or flower buds. The Hen-and-Chicken daisy in which a number of flowers surround the central flower is a fairly familiar example of proliferation.

PROPAGATING FRAME, see *Frame*.

PROPAGATION The name given to the increase of plants by any means. Propagation is a very important part of the gardener's art. Naturally it is most vital to nurserymen and others who are mainly concerned with producing large numbers of plants, but even the amateur gardener is likely to need to master some part of the art.

There are a great many methods by which plants may be increased, but these may all be grouped together under certain main headings, such as by seeds, cuttings, layers, division, grafting and budding, and it is under these headings that they are described in detail in this book.

It is important to distinguish between two main classes—seminal propagation, which means propagation by seed, and vegetative propagation, which means propagation by any other means. The importance of the distinction lies in the fact that every plant raised from seed is a completely new individual in every respect. It has resulted from the fusion of two cells, one male and the other female, each carrying a complete set of genes or units of inheritance. If these two cells have been produced by two different plants, they will carry genetical characters derived from the plants from which they arose. These will be combined in the new individual which will in consequence carry characters of both parents. Even if both the sex cells are derived from the same plant or from the same flower, the genetical characteristics which they carry may not be identical, and this is certainly likely to be so if the parent

plant is itself of hybrid origin. Because of these facts, seedlings nearly always differ in some characteristics from their parents, and often differ in a very marked manner.

By contrast plants propagated by any vegetative means, though separated from their parents, are not new individuals in quite the same sense, as they do not contain any new combination of genes or units of inheritance. They may, in fact, be considered almost as an extension of the original plant, an idea most readily grasped in the case of a division, which is simply a piece pulled from the parent plant complete with shoots and roots. Plants increased by vegetative means seldom differ in any marked respect from their parents, though there may be a modification in type of growth with a plant that is grafted, this being solely due to the influence of the root stock. All plants produced vegetatively from one original parent, no matter by how many removes, are said to constitute a clone. Thus all plants of the popular rambler rose American Pillar form a clone as they have all been produced by budding, layering, cuttings or other vegetative means from the original American Pillar or from a vegetatively produced descendant of it.



An offset with roots, detached from the parent plant

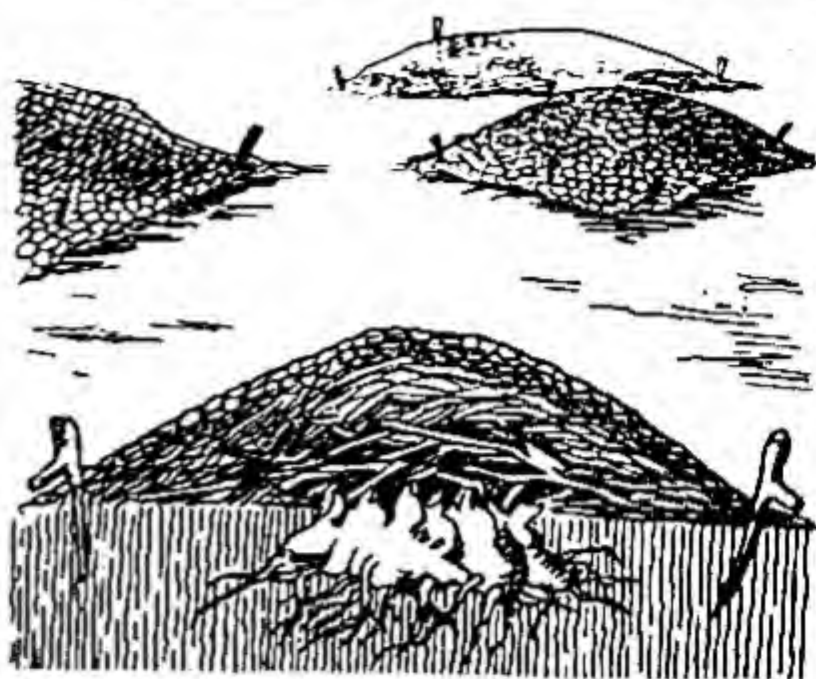
PROTECTION In the garden protection is usually required for one of four reasons; to guard plants against injury caused by low temperatures; to guard them against injury caused by high winds; to

shelter them from excessive sunshine, and to protect them from the ill effects of excessive moisture. Naturally methods used for these four quite different objects will vary greatly and much ingenuity is sometimes displayed in providing protection of one kind or another.

The most obvious method of protection is that provided by glass in the form of a greenhouse, frame or cloche. Glass will give adequate protection against both wind and damp, and though by itself it will not be sufficient to keep out severe cold, particularly if prolonged for more than a few hours, it will give some measure of protection. It can also be used as a protection against strong sunshine if it is itself coated with lime-wash, one of the many advertised shading compounds or something of that kind. A drawback to glass is its comparative costliness, its weight and its fragility.

Many substitutes for glass have been tried including some plastics such as Perspex. None of them appears to be quite as good as glass from the point of view of encouraging plant growth, but most of them provide useful protection in winter against cold winds and damp. Screens and shelters of various types can be easily made with them to stand round or over plants without disturbing them in any way.

Newly planted evergreen shrubs, and in fact many other newly planted trees and shrubs as well, sometimes suffer severely

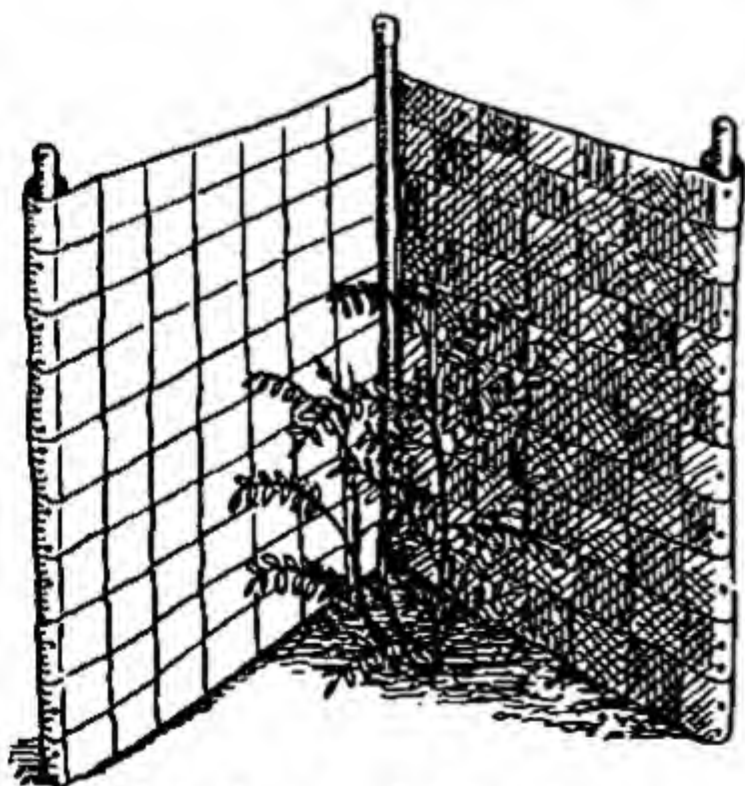


Protecting herbaceous plants with wire netting and straw

during the first few months from the effects of wind. This is due more to the drying effect of the wind than to its chilling effect, and provided the plants can be sheltered in some way from the main blast, they usually pull through quite satisfactorily. For this kind of windbreak wattle hurdles are unbeatable; failing this, hessian or sacks may be used, nailed to strong wooden uprights. Yet another alternative is to use evergreen branches thrust into the soil like peasticks. All protection of this kind, applied for the purpose of keeping off wind, should be in the form of an open-topped screen, no attempt being made to cover the plant above as this would only cause it to make premature growth which would be more than ever susceptible to injury.

Slightly tender shrubs planted against walls can usually be protected from winter cold by placing one or two wattle hurdles in front of them, 6 or 7 inches away from the twigs. If the weather should be very severe, the space between the hurdles and shrubs can be stuffed with dry straw or bracken. Once again no attempt should be made to close in the top where there should be a free outlet for warm air.

Some herbaceous plants require a measure of protection from severe cold in winter. Two familiar examples are gunnera and cremurus. Both can be cut down to ground level in the autumn, and a simple method of protecting the crowns is to place a piece of wire netting over each, bent in the form of a low tent, and then cover this



Protecting a newly-planted shrub

with a good thick layer of straw with a further piece of netting pegged on top to prevent the whole from being blown away. The purpose of the lower piece of netting is to prevent the covering material from pressing too closely on the crowns and possibly causing them to rot. Another method sometimes used, particularly with *eremurus*, is to cover with a cone of sand or ashes which can be left in position until the shoots push through it in the spring.

Some perfectly hardy plants are very susceptible to excessive wet in winter, notable amongst these being many plants from the high alpine slopes, particularly those with rather woolly or hairy foliage. On their native mountains they are accustomed to be protected by a deep layer of frozen snow in winter, and this keeps them perfectly dry. In our climate they are frequently wet and this not only tends to make them rot, but also encourages them to make premature growth. The remedy in this instance is to support a pane of glass a few inches above each plant, but with the sides completely open, so that there is a free circulation of air. The piece of glass can be supported on sticks with notches cut in them, or on suitably bent wires. Ordinary cloches are not suitable as they tend to force growth too much.

Many plants suffer from the effects of strong sunshine in summer. This is particularly true in the greenhouse, where the heat on a sunny day can become very intense, but it can also happen outdoors, particularly with evergreen shrubs from countries in which the climate is very wet and the sky frequently covered with clouds.

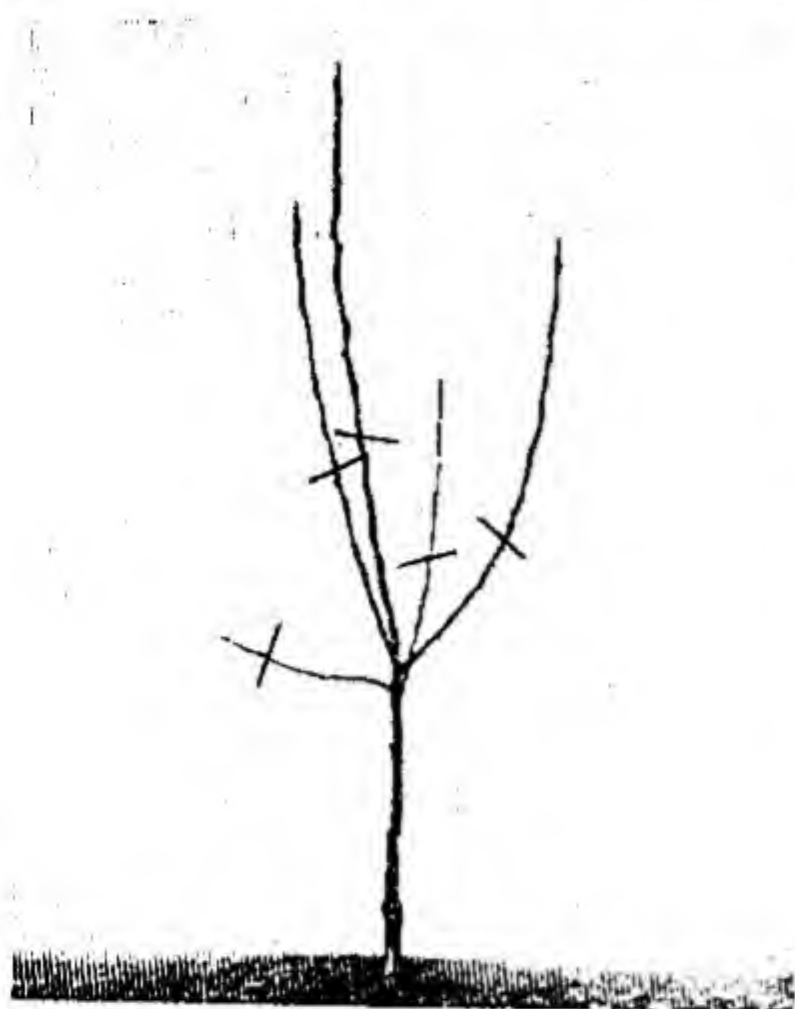


Protecting frames against frost

This is true of many of the Asiatic rhododendrons, which in Britain often suffer more damage from hot sunshine than from frost. The remedy in this case is to plant in the protection of trees or in a similar shady place. Under glass it is often very difficult to keep the temperature sufficiently low in summer, though shade can be provided by the means already described. Few small greenhouses have adequate provision for ventilation. There should be ventilators both in the sides and in the roof, so that a free circulation of air can be obtained when required.

PRUNING The act of cutting back a plant in any way, particularly applied to the cutting back of fruit and ornamental trees and bushes for the purpose of controlling their shape and regulating the crops of flowers and fruits which they produce. Pruning is one of the most difficult arts which the gardener has to master, and one upon which opinions vary greatly. With fruit trees alone there are a number of different systems of pruning, each with its own advocates, and each, no doubt, with some points in its favour.

The main purposes of pruning are four: (1) to form the specimen according to the requirements of the gardener; (2) to remove superfluous parts so that the energies of the plant can be concentrated upon what really matters; (3) to remove damaged or diseased parts and (4) to control the quantity and quality of flowers and/or fruits produced. Different methods of pruning will be required for each different object. **Pruning for shaping** Purpose No. 1 will be of greatest importance while the tree or shrub is still young, and may become entirely unnecessary later on. This, however, is only likely to be fully true of comparatively informal shapes. The more artificial the shape, the more likely it is that some pruning will always be necessary to maintain it. Thus a standard apple tree will need little pruning for the purpose of keeping it in shape, once its head of branches is well formed, whereas a cordon-trained apple tree will need to be pruned at least once annually, and possibly twice, as long as it is grown. If it is left unpruned



Pruning a maiden apple tree. Growths are cut back to the black lines

for even a year or so it will lose its cordon character and develop into an untidy bush.

Pruning to remove superfluous parts is immensely important with many fruit trees that are of bearing age and also of some ornamental trees and shrubs. Thus with many flowering shrubs that produce their best blooms on young, or fairly young, wood, pruning is designed to get rid of as much as possible of the older wood without jeopardising the production of young wood. Peach pruning is entirely of this character, and so is the routine pruning of raspberries and blackberries.

Pruning to remove damaged or diseased parts is so much a matter of common sense that no more need be said about it.

Pruning to control the quantity and quality of the flowers and/or fruits produced is closely linked with purpose No. 2. Some fruit trees tend to bear a crop one year and exhaust themselves so much in the process that they take the next year to recuperate. This biennial bearing can be a great nuisance with certain varieties of apple. To prevent it, fruiting spurs are greatly reduced in size or number during the 'off' year, i.e. the year when there is no crop. As a result less fruit than usual is

produced during the 'on' year and the tree is able to produce a further lot of fruit buds to bear the following year.

Drastic thinning of fruiting spurs, fruiting wood or even the fruits themselves may also be used to increase the size of the individual fruits. This is because the flow of sap from the roots is not greatly checked by winter pruning though the number of fruits produced may be greatly reduced by the right kind of pruning. As a result each fruit gets a larger supply of sap and grows to a greater size.

Pruning of this kind is used by rose growers who want blooms of the largest size. The branches are cut back really severely and, as a result, fewer shoots and fewer blooms are produced. But the flow of sap remains much as before so that each bloom gets more sap and is able to develop more fully than on an unpruned or even on a lightly pruned tree.

The notes which follow are largely based on the pruning of apple and pear trees but many of the principles described can be applied to other trees and shrubs.

Young plants, as they come from the nursery at the end of their first season of growth, are generally provided with one main shoot and a few subsidiary shoots; these are often known as feathers. This is the basic material upon which the gardener starts to work. If a single-stemmed cordon tree is to be formed, the side shoots are all



Pruning black currants

cut back to within about half-an-inch of the main stem, but this main stem itself is left unpruned; it is tied to a strong stake. This work is done in the autumn or winter with all deciduous trees or shrubs, including fruit trees, or in spring where evergreens are concerned. When growth recommences there will most likely be a strong shoot from the bud at the tip of last year's main stem. This should be tied to the stake and encouraged to grow, while any side shoots which form below it may be shortened, usually about the middle of the summer. This process is continued for several years until the main stem has reached the required height, after which any further upward-growing shoots are cut out each year, so that the whole strength of the tree is concentrated upon producing flowers and fruits on the side growths, which are themselves pruned back fairly severely to keep the distinctive and neat shape of the cordon. This is a popular form of training for some choice varieties of apples and pears, and also, to a lesser extent, for gooseberries and red currants.

A standard tree is formed in very much the same manner in the first two or three years, but then, when the main stem has reached a height of 5 or 6 feet, the top is shortened by a few inches in winter (or spring in the case of evergreens), so that it is forced to make several side growths at the top instead of one terminal growth. These side growths form the basis of the main branches which are to form the head of the standard. A year or so later, when the head itself is beginning to be well formed, all side growths on the main trunk are carefully removed close to the trunk. The standard head itself is formed in exactly the same way as a bush tree (below).

A bush tree consists of spreading branches radiating from a short main trunk or leg. It is formed in the first year by cutting back the main shoot of a young plant to within about 2 feet of soil level. As a result of this it will be unable to make one strong terminal growth the following summer, but instead will make several side growths, which will most likely be spaced fairly evenly all round the main stem. If they are not spaced evenly in this way, a dor-

mant bud on the bare side of the tree must be encouraged to start into growth, and this can be done by removing a small, crescent-shaped piece of bark immediately above the bud. The best time for performing this operation, known as notching, is in early May with fruit trees, or shortly after growth has started with other kinds of trees (see *Notching*).

At the end of the first year's growth after pruning, the bush will have a short main stem with three or more side growths radiating from it. Each of these side growths is cut back to about a half its length, partly to stiffen it, and partly to encourage further branching the following year. The point to bear in mind in this type of pruning is that any shoot left to itself will tend to grow without branching a great deal, whereas a shoot that is shortened will tend to produce several branches just below the point of cutting. By altering the severity of the pruning the gardener can not only decide where the branches are to come but also, to some extent, can control their vigour, for it is also a general rule with this type of pruning that the harder one cuts the stronger the growths will be the following season.

Where bush apple trees are concerned, it is desirable that the branches should be at least one foot apart, and so it will obviously be undesirable to prune any side growth back to a point at which it is nearer than one foot of its neighbour. Side growths which are not required to provide the basis of further branches are often shortened to a length of a few inches in the summer to prevent the tree from becoming overcrowded with weak or unwanted growth. In some instances it is better to cut some of these side shoots out altogether and retain others at full length and this will depend on the nature of the tree or bush under consideration.

To form a fan-trained tree the young tree is cut back to within about 2 feet of ground level, exactly as is done with a bush, but when growth commences in the spring only those shoots growing in one plane are retained; others which grow forward or backward are cut out at an early stage, unless they can be trained into the required

plane. It is usually necessary to erect some kind of temporary framework of bamboos, or place the young trees against a trellis, so that slightly misplaced shoots can be trained into position. At the end of the first year, the side growths which are formed are themselves cut back by about half their length, in the same manner as with a bush tree, the object being, as before, to make them branch. Once again only branches in the desired plane will be retained, all others being cut out. In this way a tree is built up in three or four years with main branches radiating rather like the ribs of a fan from one short main trunk. Such trees are very suitable for planting against walls. This is a popular form of training for plums, cherries, peaches, nectarines and apricots.

The horizontal-trained tree is slightly more complicated than the fan. It consists of one upright main trunk from which horizontal branches extend in pairs, and parallel to one another. The young tree is cut back to within about 18 inches of ground level, and the following spring only three shoots are retained—one to be trained upright, and the other two to be bent down, one to the left and one to the right, and tied



Summer pruning side growths of gooseberries where overcrowded

to a trellis or suitably placed bamboo canes. The second winter the upright shoot is cut back to within 15 to 18 inches of the first pair of horizontal branches, while the side shoots themselves are not pruned at all. As a result of this treatment each side growth will produce one main shoot the following summer, which should continue to be trained horizontally, while the upright shoot will produce several branches of which only three should be retained; one to go upwards again, and two more to form the second pair of arms by being bent down to left and right. The third, fourth and any further pairs of arms can be added in the same way in successive years. When sufficient arms have been obtained, the central shoot is cut right out and thereafter no further growth is allowed in this direction. Similarly, the side arms are allowed to extend without pruning until they have filled their allotted space, after which the young terminal growth is cut out regularly. This is a popular form of training for apples and pears.

The pyramid tree is something between the horizontal-trained tree and a bush, in fact it is very much like the Christmas tree of tradition. Many trees and shrubs, particularly conifers, have this habit quite naturally and no pruning whatever is required to impose it upon them. But with fruit trees it is not a natural habit, and careful pruning is required if a pyramid is to be formed.



Summer pruning apples to five leaves to check further growth (see p. 196)

It consists of a main vertical stem with horizontal branches radiating from it in all directions, not just in one plane as with the horizontal-trained tree. The method of forming such a tree is rather similar to that of forming a horizontal-trained tree, i.e. the central growth is cut back each year to the point at which side growths are required. However, instead of only two side growths being allowed to form each summer, several are retained and no attempt is made to tie them down horizontally. They are permitted to take their natural course. One centre growth is retained each year and encouraged to grow as nearly upright as possible. Side growths are themselves shortened by about half their length each winter to encourage further branching.

Pruning of established trees and bushes After a period of years, which will vary according to the rate of growth and character of the tree or bush in question, there will be a gradual change in the pruning, less attention being paid to the formation of new branches and greater attention to the regulation of crops of flowers and/or fruits. Pruning is seldom solely directed towards attaining the maximum possible flower or fruit production in any one year. Probably the simplest way of doing that would be to leave the tree or bush completely unpruned, for, as it is the natural function of most trees and shrubs to produce flowers and fruits, they will certainly do so if left to their own devices. The trouble is that frequently, without pruning, the flowers or fruits are so numerous that, individually, they are of poor quality, and moreover the tree or shrub may so exhaust itself one year that it takes a rest the next. The gardener's problem, therefore, is both to improve the size and quality of the produce, whether for utility or ornament, and to ensure that there are no blank years.

The method of pruning to be employed to produce these results will vary considerably according to the age of wood upon which the particular plant in question produces its best flowers and/or fruits. As an example, apple and pear trees flower and fruit most freely on shoots not less than one year, and up to four or five years old.

They may continue to fruit on older wood than this, but the fruit will tend to be less abundant and of smaller size. By contrast, summer-fruiting raspberries produce all their crop on one-year-old canes, and these die after cropping, so making way for another lot of young canes to crop the following year. Less extreme than this is the behaviour of the Morello cherry, the peach, and the nectarine which produce their best fruits on one-year-old shoots, though these shoots do not die after fruiting and may even bear some flowers and fruits in succeeding years. Obviously with apple and pear trees it will be a mistake to cut out all young growth after fruiting, whereas with raspberry canes this is essential, and with the Morello cherry, peach and nectarine it is desirable to remove quite a lot of the young growth that has fruited.

A similar division, according to the method of bearing, can be made where trees and shrubs are grown solely for ornament. Brooms, for example, produce all their flowers on year-old stems, and the American currant, *Ribes sanguineum*, also produces its best flowers on the shoots produced the preceding year. By contrast, ornamental crab apples and quinces (*chaenomeles*) flower freely on both year-old and older growths and the same is true of *pyracantha*.

Regulation pruning Where both young and older growth is suitable for the gardener's purpose, several alternative systems of pruning may be adopted. The simplest of these is that known as regulation. This consists in a slight thinning out of the branches and stems each autumn or winter, the purpose being to remove any branches that are rubbing, or threatening to rub, other branches, or are so close to them that, when covered with leaves in the summer, they will cut off too much light and air. At the same time any diseased or damaged wood must be removed. When adopting this form of pruning, the only skill which the gardener has to exercise is that of deciding which of any two shoots is to be removed; he must always aim to take that which is older and less well provided with flower or fruit buds. This will involve a little study of the character of growth pro-

duced by the tree. Old wood is generally darker and harder looking than young wood, and fruit or flower buds are usually fatter and more prominent than growth buds. The aim in regulation pruning should always be gradually to eliminate the oldest wood, so making room for younger stems which are only just beginning to flower or fruit. If at times fairly large branches have to be removed because they have gradually sagged with the weight of former crops until they are dangerously near other branches, this should be done either right back to the main trunk, or to a suitably placed side branch. This latter process is known as dehorning. Even quite small cuts should be made either to a bud or to a side shoot; if stumps of bare wood are left without buds or side growths, they will be unable to produce any leaves of their own and so will be deprived of a supply of sap and will in time die, so causing decay which may spread into the remainder of the branch. Regulation pruning is practicable with a great many ornamental trees and shrubs as well as fruiting trees, and is perhaps the most generally useful of all forms of pruning. The objects are always the same—to prevent overcrowding, to prevent branches from rubbing together and doing one another injury, and to get rid of the oldest stems or branches which may be presumed to be losing vigour. It is a system also applied to many roses, particularly rose species, vigorous roses of the hybrid musk and hybrid rugosa types, and also hybrid polyantha and polyantha pompon varieties.

Renewal pruning A development of regulation pruning which is particularly applicable to apples and also to pear trees, is known as renewal pruning. The object of this is to regulate the growth of the tree in the manner already described and at the same time to ensure a succession of young shoots in the right places in order to replace older shoots as soon as they cease to be profitable. The method requires more skill and judgment than regulation pruning, but is not really difficult. Taking one typical branch of an apple tree as an example, this will be found on examination to have produced a number of side branches varying

in length and age. The object is to cut back a proportion of these side shoots to stubs about 3 inches long, which will produce more young shoots the following season, and so provide a succession of young growth. The remaining side shoots will be left unpruned so that they may produce flowers and fruits throughout their length. Where a variety of moderate vigour is making average new growth, two out of every three young (year-old) laterals can be cut back in this way, the third being left at full length, while of the two-year-old fruiting laterals, alternate ones may be shortened to about 8 or 9 inches to prevent



Pruning raspberries by removing old canes

overcrowding. Laterals that are three or more years old, are cut out anyway as they are considered to have seen their best days. These older laterals are cut right out and not left with short stubs.

Apple trees pruned in this manner tend to produce much longer fruiting branches than is normal with more severely pruned trees, and these tend to be weighed down by successive crops until they often assume a semi-weeping habit. When this becomes too severe, so that the branches trail on the

ground or interfere with other branches below them, they must be shortened to a strong side branch growing in a more erect position. With a little care replacement leaders, i.e. new stems which are to take the place of old branches, can be encouraged to form a year or so before they are actually required. This is done by selecting a suitably placed young side shoot and removing 4 or 5 inches from its tip in the autumn, which will encourage it to make one or two more strong shoots the following year. The less vigorous of these is left unpruned, or shortened to a 3-inch stub, while the more vigorous is shortened again by about 3 or 4 inches to encourage a further strong growth the next year. In this way, a sturdy replacement leader can be built up in three or four years and the original leader removed at the point at which this branch leader joins it.

The renewal system can be briefly described as one which aims at a suitable balance between growth of new wood and a supply of older wood to bear the crops. Cropping is encouraged by leaving some side growths unpruned, while new growth is encouraged by pruning some side growths fairly severely.

Spur pruning Renewal pruning is only suitable for trees of more or less informal shape, such as bushes and standards. It cannot be applied to trained trees such as cordons or horizontal-trained trees, because these would quickly lose their distinctive shape. For these formal shapes, where trees that bear on fairly young and older growth are concerned, some variation of the system broadly known as spur pruning must be adopted. A spur is the name given to the clusters of fruit buds which naturally tend to form on the older branches of trees such as apples and pears and others which have this mode of bearing. Some spurs will be produced quite automatically without any interference on the part of the gardener. Some may be induced by shortening the thinner side growths, particularly if this work is done in summer rather than in autumn.

One of the most satisfactory systems of spur pruning, so far as apples and pears are concerned, and one which can also be applied with slight modifications to many

ornamental trees and shrubs, is to shorten all the thicker side growths to a length of 5 or 6 leaves between the middle of July and the middle of August. This pruning causes considerable loss of leaf in the middle of the growing season, and consequently checks further growth. The following autumn the summer-pruned shoots are further cut back to a length of 2 or 3 buds.

Peach pruning This system of pruning, though it gets its name from the peach, can be applied to many other trees which produce the best fruits on young (year-old) stems e.g. nectarine and Morello cherry. It is really a method of thinning and regulation and is based on the idea that as many as possible of the fruiting shoots should be cut out immediately after the crop has been gathered, but that, if this is to be done, at least an equal number of young shoots must be provided to take their place. During the spring and summer most young side growths, besides producing some flowers and possibly fruits, will also produce some subsidiary side growths. Most of these are rubbed out at an early stage with finger and thumb, but about a third of the fruiting side shoots are retained; one situated at the tip of the shoot with the object of drawing sap through it, one or two midway up the shoot, and at least one as near its base as possible. In the autumn, when the fruit has been gathered, the original side shoot carrying both the young tip shoot and the



Spur pruning

midway shoots is cut out, but the basal young shoot is retained to take its place.

Current and blackberry pruning A simplification of this form of pruning can be used when pruning blackcurrants and other bushes which bear their best crops of either flowers or fruits on year-old stems, but when in good health usually make a sufficient quantity of replacement stems without any further help in the way of pruning or thinning. The method is to cut out the fruiting stems as soon as the crop has been gathered, removing them as far as the first sturdy young shoots which can replace them. No thinning or rubbing out of shoots is done as with peach pruning. Occasionally when the plant loses vigour and refuses to make sufficient young replacement growth, a few or even all of the old branches must be cut hard back to within a few inches of the base, usually in autumn or winter, and the plant must be fed thoroughly to force vigorous new growths the following year. It should be noted that red currants bear fruits on spurs and should be pruned like apples.

Blackberries and loganberries are pruned on the same general principles, i.e. in the autumn the old canes that have already produced fruit are cut out and the young canes that have grown during the preceding summer, but have not yet produced any fruit, are retained to take their place. Many rambler roses respond to exactly the same treatment, the old stems that have just borne flowers being cut out in September, October or November, the young stems which have not yet had any flowers being retained.

Pruning of ornamental plants When dealing with shrubs or trees grown solely for their flowers, it is often advisable to complete pruning earlier than would be possible with trees or shrubs grown for fruit, e.g. with forsythia, which flowers in early spring mainly on the two-year-old wood, it is very desirable to cut this flowering wood out as soon as the flowers have faded, which may mean pruning in April. The flowering growths should be cut back as far as the first younger growths, which may replace them. This treatment prevents the bushes from becoming overcrowded



Fruit buds developed as a result of spur pruning

and encourages the most vigorous production of young wood.

By contrast there are a few flowering shrubs which produce their best flowers late in the summer or early in autumn on young shoots produced that same year. This is notably so with *Buddleia Davidiana*, which can be pruned almost to ground level in spring and will, as a result, produce extremely strong young growths each terminated by a fine spike of flowers in August.

A very similar method is applied to a great many bush roses including most hybrid teas, hybrid perpetuals and pernetianas. The method in this instance is to prune in March to remove as much as possible of the wood that is more than two years old, and to cut back all the vigorous shoots to stubs, which may vary from 1 inch to 8 or 9 inches in length, according to the particular variety under consideration. These stubs will then throw out many strong new shoots which will be terminated by fine flowers in the summer.

With many flowering shrubs, regular pruning in the accepted sense is hardly ever carried out, but faded flower heads may sometimes be removed to prevent the production of seed where this is not decorative,

and would place an unnecessary strain on the plant. This is the treatment always advocated for rhododendrons; it is often known as dead-heading, and should be done as soon as the flowers have faded.

Pruning of climbing plants Climbing plants are as varied in their habits of growth and of flower and/or fruit production as are trees and shrubs, but the same general principles of pruning apply. With the grape vine, for example, pruning in the early years is largely intended to produce sturdy growth so that a strong main rod, or rods, may be produced in the shortest possible time.

In consequence the main young growth (as each main growth of the vine is intended to carry several rows) is shortened by a half or more every autumn so as to retain the sturdiest part of it and encourage this to throw out further strong shoots the following year. This pruning is done in winter when the vine is quite dormant. Once the main rods have been formed a kind of spur pruning is carried out each winter, every side growth from a main rod being cut hard back to one or at most two buds. From these stumps new fruiting side growths are produced the following year, and these are pinched before they get so long that they interfere with their neighbours or take too much light from the vinery.

Wisteria responds to a form of pruning that closely resembles vine pruning, while clematis must be pruned according to the

character of the growth produced by the particular variety in question, which will depend to a considerable extent on the class to which the variety belongs. Thus varieties of the Jackmanii class can be pruned hard, whereas *C. montana* and its varieties require practically no pruning.

Lorette Pruning A special form of spur pruning named after Monsieur Lorette and applicable to apples and pears only. Side growths from the leaders only are pruned during June, July and August as they attain pencil thickness at the base. They are cut back to a length of $\frac{1}{4}$ inch, that is right into the basal rosette of leaves. At the last pruning in August side growths from other parts of the tree are also dealt with in like manner. Shoots which are not of pencil thickness by mid-August are tied downwards. Leaders are shortened by one third their length in late April. No winter pruning is done.

The object of Lorette pruning is to stimulate the stipulary buds at the base of each shoot and encourage them to develop into fruit buds.

Tools for pruning Experts always prefer a strong sharp knife to any other pruning tool but it is one that takes some skill in handling. A knife clumsily used can cause a great deal of damage and the novice will be better advised to use a sharp pair of secateurs as his main tool. In addition he will need a sharp saw for removing branches too large to be cut with secateurs or knife. A long-handled pruner will be found of great value in pruning standard trees and big bushes, the branches of which cannot readily be reached from ground level.

All cuts must be made as cleanly as possible. Saw cuts should be pared down with a sharp knife so that they are left as smooth as possible. When branches or shoots are removed it should always be right back to the main branch or trunk from which they grow. When branches or shoots are shortened it should always be to a leaf or bud or to a side branch or side shoot.

Large wounds may be coated with warm grafting wax, white lead paint or Stockholm tar as a protection against infection by fungi but it should be observed that, as long as they do not become so infected, un-



Pruning of vine. Line indicates point of pruning; arrow, dormant bud

dressed wounds almost always heal more quickly.

PUBESCENT Downy; a botanical term used to describe leaves or stems which are covered with soft but short hairs.

PUDDLING The practise of dipping the roots of plants into a thick mixture of water and soil, or some other substance, when they are transplanted. Puddling is practised for two main reasons, partly because it is supposed to protect the plants against the effects of drought immediately after planting, and partly because it is believed to be effective in protecting them against certain pests, notably cabbage root fly. It is however, very doubtful whether puddling is of much practical value in either respect and this old-fashioned practice is gradually dying out.

PYRAMID The name given to a form sometimes adopted in the shaping of fruit trees, particularly apples and pears. A pyramid tree consists of an upright central branch or trunk from which other branches radiate in all directions, in fact such a shape as one associates with the conventional Christmas tree. (See *Pruning*.)

PYRETHRUM INSECTICIDE An insecticide prepared from the flowers of the pyrethrum (*Chrysanthemum coccineum*). It can be purchased in the form of a dust mixed with a suitable carrier and ready for application, and also as a dry powder which is soluble in water. In either form it will kill many insects, particularly greenflies and other species of aphids. It is particularly valuable because of its rapid effect, and is often included in domestic fly sprays for this reason. Manufacturer's instructions should always be followed as regards mixing, as different brands may vary in strength.

PYRIFORM Pear-shaped; a botanical form used to describe fruits which are of this form.

QUASSIA The wood of a tropical tree which, when boiled in water, gives an extremely bitter extract which is obnoxious to many insects. At one time quassia

was a favourite remedy in the garden, particularly for greenflies and other species of aphids. It has, however, little real insecticidal value and drives insects away rather than kills them. In consequence it has been almost entirely superseded by more effective insect poisons such as nicotine, HETP, gamma-BHC and derris. If it is desired to use quassia, it should be purchased in the form of chips which should be prepared by boiling for two hours in water, using 4 ounces of chips to 1 gallon of water, and, after boiling for 10 minutes, adding 1 teaspoonful of carbonate of soda. Strain off the chips after two hours and boil for a further hour in another gallon of water. Then strain again and add one lot of liquid to the other. Dissolve 8 ounces of soft soap in a further gallon of hot water and add this to the two gallons of quassia extract. Finally make up to 5 gallons with cold water, stir well and use in the form of a heavy spray.

QUICKLIME The popular name of oxide of lime, i.e. chalk or limestone which has been burnt in a lime kiln. Quicklime readily combines with water to produce hydrated lime, and in the process considerable heat is generated. Quicklime is sometimes known as lump lime. It can be used as a soil dressing but on vacant ground only, as it is extremely caustic to foliage and tender shoots. If the lumps are scattered over the surface of the soil, they will soon break down to a very fine white powder, by combining with moisture in the atmosphere and surface soil, and this powder, which is hydrated lime, can then be spread more evenly and either be left to be washed in by rain, or mixed with the surface soil by digging or forking. Because of its caustic nature quicklime has some insecticidal value. It is, however, an unpleasant substance to handle as it burns the skin and clothes and tends to burst any bags in which it is stored. For the correction of soil acidity it is no more effective than hydrated lime, and as this is much easier to handle, it is the form of lime most commonly employed in the garden.

RABBITS These can be extremely

troublesome pests in gardens, particularly in country districts. Most soft-stemmed plants are attacked and may be eaten to ground level, while many trees and shrubs may also be barked. If the bark is removed right round the main trunk or stem, the whole tree may be killed.

The only complete remedy against rabbits is to wire the whole garden, using for this purpose wire netting with a mesh not exceeding one inch. The wire should be buried to a depth of 1 foot in the ground and should extend to a height of at least 3 feet above ground level. Various substances have been recommended as having a deterrent effect upon rabbits. One of the best of these is foetid animal oil—an evil-smelling dark brown or blackish fluid which can be painted on the trunks or main stems of trees and shrubs likely to be attacked. Fish-glue has also been recommended. There are various proprietary rabbit deterrents which can be used in much the same manner and it is also said that sacks soaked in creosote and placed on the ground will keep rabbits away. If, despite precautions, trees or shrubs are attacked and barked, they can be encouraged to heal if the wounded area is immediately painted with warm grafting wax. In very severe cases bridge grafting (see *Grafting, Bridge*) may be used to carry sap from the roots over the barked area to the branches above.

RACEME A botanical term used to describe elongated, unbranched flower clusters in which each flower is attached by a stalk to a main stem and in which the lower flowers commence to open first. A hyacinth flower is of this type.

RADICAL Belonging to the root of a plant.

RAFFIA A plant fibre used in gardens for tying material. It has to some extent been superseded by soft string of one kind or another, notably those types of string known as fillis and twist. Nevertheless, for many purposes, raffia is still unbeatable, as it is broad and pliable and does not tend to cut into tender growth as easily as string,

however soft. The fibre is obtained from the leaves of an African palm known as *Raphia Ruffia*.

RAKE Garden rakes are of several different kinds, according to the purpose for which they are required. The most familiar is no doubt the steel rake with rigidly fixed teeth an inch or so in length. Various sizes can be obtained, but for general purposes one about 12 inches in width is most convenient. Its purpose is to complete the breaking down of soil when preparing seed beds, etc., to remove stones and hard lumps of soil, to cover seeds, collect rubbish, smooth gravel paths, etc. The very much larger, wooden rakes used by farmers for collecting hay are also sometimes employed in the garden, particularly for raking up dead leaves and other light refuse, and for levelling large areas of ground. Then there is the spring-tined rake in which the head is formed of a number of long spring-steel wires, arranged in the form of a fan, and with their tips bent over at right angles. Rakes of this type are used on lawns to remove refuse and drag out moss without injuring the grass itself. A similar type of rake is also sometimes made of split bamboo canes and is suitable for the same purpose.

The raking of soil, particularly in the preparation of seed beds, is a task calling for considerable judgment and skill. It should not be attempted when the surface of the soil is really wet, but is most effective when it is drying out but not yet absolutely dry. In this condition the soil is most readily broken up and is unlikely to be unduly compacted. The rake should always be used lightly and with long sweeping motions backwards and forwards. In the movement towards the body the rake is mainly effective in drawing stones and unbreakable lumps from the surface, whereas in the movement away from the body, the soil is broken down. When using a spring-tined rake, the teeth should only be kept in contact with the soil while being drawn towards the body. It is not possible to use this type of rake with the two-way action as can be done using a rake with rigidly mounted teeth.

If the ground is raked in one direction only, a number of tiny furrows will be left in the surface by the teeth of the rake. If seeds are then sown, many of them will fall into these furrows. Now if the ground is raked in the opposite direction, the furrows will be filled in and the seeds covered. This technique is often used for sowing and covering seeds which are to be distributed broadcast, as for example grass seeds to form a lawn or seeds of hardy annuals to form informal groups of plants not regularly spaced.

RAPE DUST A waste product from oil mills, which contains 5 to 6 per cent. of nitrogen in organic form. Unfortunately this nitrogen is only very slowly liberated in the soil and rape dust is not, in consequence, of much value as a plant food, though it is often used to give bulk to more concentrated fertilizers. If used alone, applications should be at the rate of about 4 to 6 ounces per square yard, at any time of the year.

RASPBERRY BEETLE This beetle is rather small and either greyish or golden brown in colour. It attacks the buds and flowers of raspberries sometimes causing a good deal of damage. Even more troublesome are the white maggots which emerge a few weeks later from the eggs laid by the beetles and at once eat into the ripening fruits so causing the familiar but objectionable maggotty raspberries. The remedy is to spray or dust with derris when the blossom is open and again about a fortnight later or as the earliest fruits start to colour.

RATS These pests may cause damage to trees similar in character to that caused by rabbits though usually on a smaller scale. They will also eat bulbs, corms and tubers, both in store and in the ground. Potatoes and carrots in store are particularly liable to be attacked. Rats can be poisoned with one of the many advertised poisons or viruses or with arsenic, and for this purpose a bait of fat or fish will usually be found to be most effective. Large nipper-type traps or cage traps may also be used to catch rats while yet another method is to coat

pieces of board or stout cardboard with a sticky substance known as rat-sticker and place these where the rats are likely to run. If a bait is placed in the middle of the board it will attract rats on to it and they will be held firmly.

RAY-FLORETS The outer florets of certain members of the daisy family in which the central disk of close packed florets is surrounded by other showier florets each with a strap-shaped corolla,

RECURVED Curved or bent downwards. A botanical term used in the description of leaves, petals, etc. which are formed in this way.

RED BERRY MITE A tiny mite which attacks the young fruits of blackberries, loganberries and other bramble fruits, causing them to ripen unevenly or to become malformed. The popular name refers to the fact that affected fruits are often partly black and partly red. The best remedy is to spray with lime sulphur at a strength of 1 part of the concentrated fluid to 40 parts of water, using this about three weeks before the blossom period.

RED PLUM MAGGOT The name of this pest does not imply that it attacks red plums only, but that it is a red maggot which may attack any kind of plum. It is a small caterpillar which may be found in the fruits from mid-June onwards. Winter-spraying with tar oil wash will do much to control it, but in troublesome cases trees should also be sprayed with derris towards the end of June.

RED SPIDER The name of these familiar pests is rather misleading as they are neither spiders nor are they red. They belong to the family of mites and are brownish or at most reddish-brown in colour. They are so small that they can only just be seen with the naked eye. A hand lens will reveal them as having roundish bodies and eight legs. They cluster on the undersides of leaves, chiefly in the angles of the veins, and they live by sucking sap. As a result the leaves develop a mottled appearance, usually greyish or bronzy in colour.

There are many different species of red spider which attack particular kinds of plants. Apples in the open, and peaches and nectarines under glass are particularly susceptible to attack, and so are vines, violets, cucumbers, melons and carnations.

Red spiders thrive in hot dry atmospheres and are discouraged by moisture and low temperatures. Under glass attacks can often be prevented by giving ample ventilation and maintaining a damp atmosphere by frequent syringeing with clear water. Fumigation with azobenzene or the use of azobenzene aerosol, will usually give complete control if an attack does occur. Parathion is also extremely effective but is such a dangerous spray to use that it cannot be recommended for the amateur. A new chemical chlorbenside (Chlorparacide), which is non-poisonous and non-tainting gives complete control of red spider. For fruit trees one spray should be given at green-bud stage and is sufficient to protect the trees for that year. It can be used on any other plants outdoors or under glass and should be applied either just before an attack is expected to start or immediately it is observed.

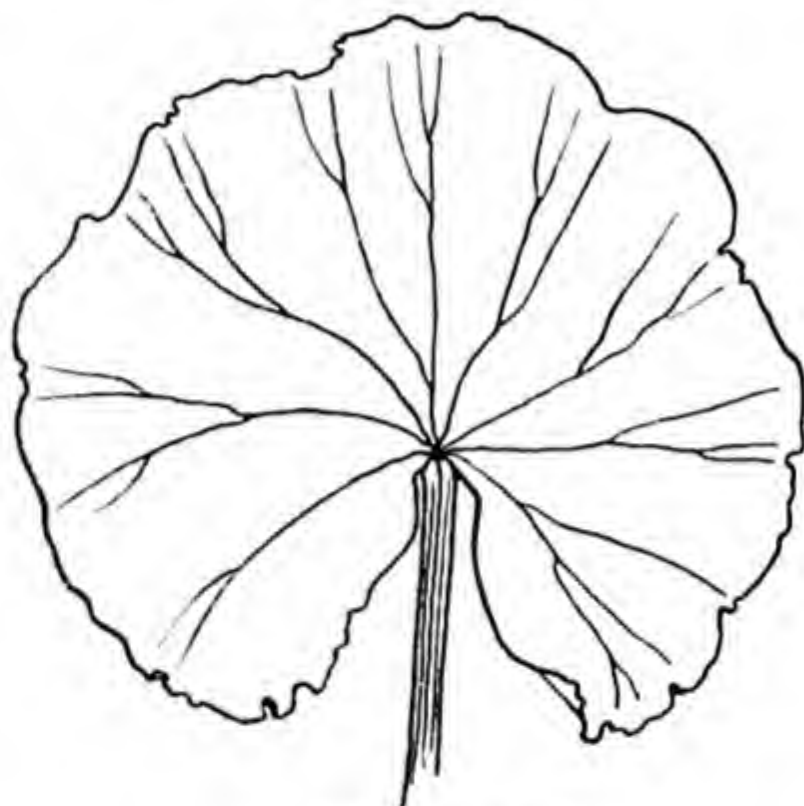


Red spider on a carnation

REFLEXED Sharply or abruptly curved or bent downwards. A term much used in the description of leaves or petals which are

formed in this way. Thus the flowers of some chrysanthemums are said to be reflexed because many of the petals curve outwards and downwards,

RENIFORM Kidney-shaped; a botanical term used to describe leaves, etc. which are of this form.



A reniform leaf

RESTING Most plants have a period at which they make little or no growth, and are then said to be dormant or resting. In some plants, notably bulbs, this resting season is extremely marked and may continue for several months, whereas in other plants, particularly greenhouse evergreens, there is very little real resting period. The plants are in growth most of the time, though possibly more slowly at one period than another.

It is most important that plants should have their normal period of rest at the right time of the year, and some cultural treatments are directed to this end; e.g. with many greenhouse-grown bulbs it is necessary to reduce the water supply very considerably as the resting season approaches to encourage top growth to die down, and then to withhold water altogether while the bulbs are at rest. Most plants require less water and less warmth during the resting period than when in growth, though their requirements in both respects will differ tremendously according

to their nature and the climatic conditions of their native habitat. Plants from tropical places with a high or continuous rainfall, are likely to have a less marked resting period, whereas plants from cold areas or from those in which there are long seasonal periods of drought, are likely to have a more clearly marked resting period.

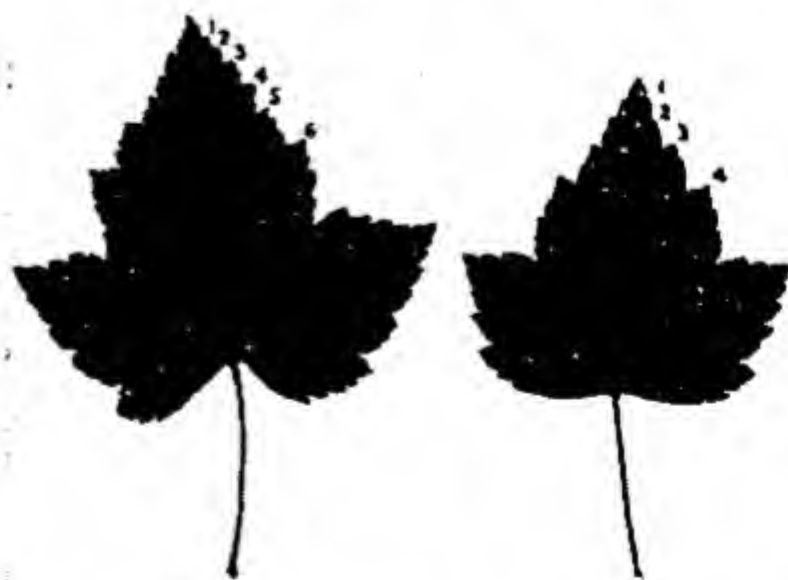
RETARDING The practice of treating plants in such a way that they mature at a later date than normal. This is usually done by low temperature treatment, but care must be exercised that the temperature is not sufficiently low to harm the tissues. Hyacinth bulbs are frequently retarded from one year until the next. Bulbs which would normally be starting into growth one autumn are kept so dry and cool that they are still dormant the following summer. If these bulbs are then planted and given normal treatment as regards moisture and temperature, they make extremely rapid growth. Retarded bulbs of this kind are used to obtain Christmas flowers. It has also been found possible to retard development by application of certain chemicals, such as those known as hormones. The growth of fruit trees has been retarded by spraying them in spring, just as they are about to start into growth, with a very weak solution of alpha naphthalene-acetic acid. Potatoes sprayed with this solution in winter do not make their sprouts at the normal period and this technique has proved useful in storing potatoes for late spring and early summer use. See *Hormones*.

REVERSION This word is used by gardeners in two quite distinct ways. A hybrid plant or one that has been highly developed by years of selection may be said to revert if it changes to an earlier form. For example, polyantha roses with orange or flame-coloured flowers frequently produce red blooms. These orange varieties were developed from red-flowered forms, so that the plant producing some orange and some red flowers may be said to be reverting to a prototype.

Reversion is also used as a name for a specific disease of currants. This disease is

caused by a virus and the rather misleading name arose from the fact that, when first observed, it was not recognised as a disease but was believed to be a form of reversion similar to that described in the first paragraph. Blackcurrants are most likely to be affected, and such bushes produce many leaves which are smaller, carry fewer lobes and have fewer veins branching from the main vein of each leaf than a normal plant. Moreover the leaves at the ends of the branches tend to be crowded together, giving the plant a somewhat nettle-like appearance. One method of diagnosis is to count the veins on each side of the main vein. If fewer than five pairs of veins are found on all or most of the leaves in the height of summer, when they should be fully developed, the probability is that the bush is suffering from reversion.

The virus which causes this kind of reversion is carried from one bush to another by sucking insects and the mites which cause big bud (*q.v.*). There is no remedy for reversion and affected bushes should be burned, but the disease can be kept down by taking measures against big bud mites, greenfly and other sucking insects. Spraying with lime sulphur wash at twice the normal winter strength when the most forward leaves are about one inch in diameter, is one useful measure, and bushes may also be sprayed occasionally with nicotine or HETP but not within a few weeks of gathering ripe berries.

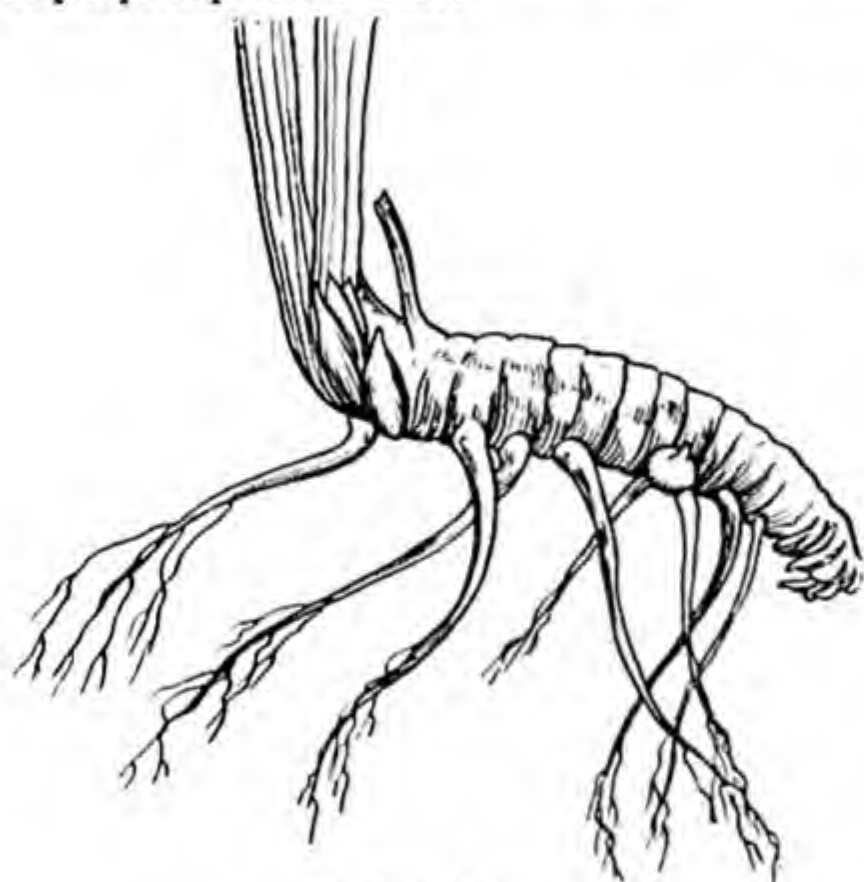


Reversion: the black currant leaf on the right has reverted

RHIZOME An underground stem usually

growing more or less horizontally and producing shoots at a distance from the parent plant. Common examples are the flag or German iris and couch-grass.

RHIZOME ROT The name used for soft rot when it attacks rhizomes of June-flowering or 'flag' irises. Irises which are badly attacked by this disease should be lifted and burned, but milder cases can be treated by cutting out affected portions of rhizome which are found to be decaying and becoming watery, and lightly dusting the rhizomes and the soil around with superphosphate of lime.



An iris rhizome

RHODODENDRON BUD BLAST, see *Bud Blast*.

RHODODENDRON BUG A small insect, a bug, shiny black in colour with transparent wings, which attacks the undersides of the leaves of rhododendrons, sucking the sap from them and causing them to develop brown spots beneath, and a curious mottled or marbled effect on the upper surface. As a result of the brown spotting this damage is frequently referred to as rust, but in fact it is not caused by a fungus nor has it any connexion with the true rust diseases. In June it is often possible to see clusters of the bugs on the rhododendron leaves and these can be gathered by hand and destroyed. In addition the bushes should be sprayed with a nicotine and soft

soap insecticide or with derris. As a rule two applications are necessary, one in mid-June and the second a fortnight or three weeks later.

RHYNCHITES A name applied to the strawberry leaf weevil and strawberry blossom weevil pests, which are described under those names.

RIDGING A method of cultivation by which the soil is thrown up into a number of steep ridges, so exposing a much greater surface to the beneficial action of wind and frost than would be the case if the surface were left flat. The usual method employed is to mark out the plot in strips $2\frac{1}{2}$ feet wide. A start is made at one end of the first strip; a trench is opened across this, one foot wide and about one foot deep and of course $2\frac{1}{2}$ feet in length. The soil from this small trench is removed to the far corner of the plot. Now the gardener commences to dig down the strip, all the time turning the soil forward. The soil from the centre of the short trench is turned straight forward, whereas the soil on the left and right-hand sides, is turned forward and towards the centre, so forming a ridge as the work proceeds. When the end of the first strip is reached, the gardener turns round and works back along the length of the second strip and so on, until the whole plot has been ridged.



Ridging

RINGING A method of preventing the return to the roots of trees of food elabo-

rated in the leaves. As a result root growth is checked, and this in turn checks production of wood. Ringing is used as a means of checking excessive vigour and encouraging fruitfulness in apple and pear trees, but it is not a desirable practice with stone fruits as it is liable to cause gumming and other troubles. The method, in its simplest form, is to remove a ring of bark, $\frac{1}{4}$ inch wide, right round the main trunk of the tree and about 2 feet from soil level. The bark should be removed right to the hard wood beneath. In this way the cambium layer is severed. If the work is done in late April or early May, a check is given to growth without injuring the tree permanently, for the ring will heal over during the course of the summer. Some gardeners prefer to give a less drastic check by removing the bark in the form of two semicircles on opposite sides of the trunk, one 3 or 4 inches above the other. Yet another modification is to remove a ring of bark round part of the trunk only, stopping an inch or so short of a complete circle.

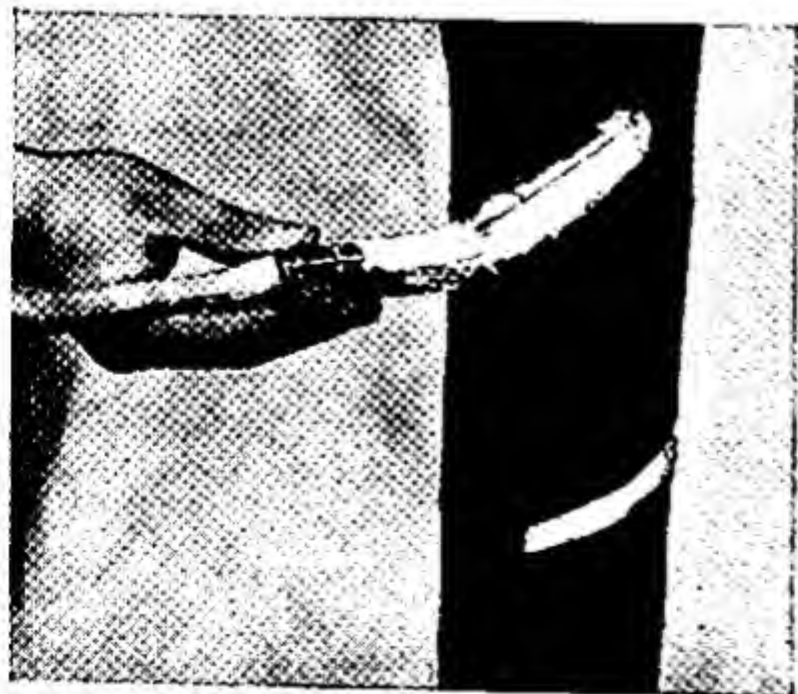
Knife-edge ringing is the name given to a less drastic method of checking the flow of sap by placing the blade of a knife against the bark and drawing it right round the stem or branch, so severing the bark to the hard wood beneath but not actually removing any bark. Knife-edge ringing is frequently used to encourage or check the growth of buds. If part of a stem of a fruit tree is bare, all the buds on it having remained dormant, knife-edge ringing car-

ried out in late April or early May at the top of this bare section will usually induce many of the dormant buds to start into growth within a few weeks. By contrast, a knife-edge ring made at the bottom of a bare section will encourage the buds to remain dormant.

ROCK GARDEN Any part of the garden reserved mainly or exclusively for the cultivation of mountain plants and those which naturally grow in very rocky places. The name rockery is really synonymous with this, though it is often reserved by gardeners to designate those constructions in which no attempt has been made to simulate the natural placing of rocks as they would appear, for example, in an outcrop on a hillside, and the term 'rock garden' is reserved for those types of construction in which the natural principles of rock formation have been observed.

Rock gardens can be made in many different ways and of many different materials. The two most favoured types of stone are limestone and sandstone, but granite is also used and many other forms of rock. The best limestone for the purpose is probably that which is known as weather-worn limestone. It is obtained mainly from the surface in Westmorland and the Mendip Hills. It carries all the natural markings produced over the ages by the action of water and frost, and is often beautifully fretted and worn. By contrast sandstone is usually quarried, and some years must elapse before it becomes fully weathered.

The site for a rock garden should always be as open as possible, as few genuine mountain plants like much shade and none appreciates the overhang of trees. The soil itself should be rather gritty and well drained, but not dry. Usually the natural soil of the site can be used as a basis, with additions of coarse sand, stone chippings, peat, etc. to produce a suitable texture. The precise mixture used will vary greatly according to the type of plant to be grown. The main effect may be varied from one part of the rock garden to another, to suit plants of various habits. If there is any doubt about the natural drainage of the site, some provision for artificial drainage



Bark ringing—painting the wound



Constructing a rock garden

should be made, either by laying land drains or by excavating all the soil over the site to a depth of about 18 inches and placing a good layer of hard rubble in the bottom, after which the soil should be returned. As a rule the soil is thrown into a series of irregular mounds and valleys to simulate the irregularities characteristic of a hillside. However, it is quite possible to make an effective rock garden entirely on the flat, or a rock garden may be made on a plain bank without irregularities.

If the rock garden is to simulate a natural outcrop of rock, a study must be made of the appearance of the various rock strata when exposed by erosion and other natural influences. It will be observed that usually the rock crops out of the ground at an angle which is maintained throughout the whole of any one formation. Moreover one layer or stratum of rock will overlies another like layers in a sandwich, and there will often be regular spacing between these successive layers.

When making rock gardens, the rocks should always be well bedded into the soil, so that they appear to form part of a larger formation below and do not merely look like stones dropped at random on the surface. Large pieces of rock will help to give an appearance of solidity and per-

manence, and often smaller pieces can be so cleverly built together that they appear to be part of the one large rock. Moreover in this way vertical crevices can be made, and, when packed with soil, many alpine plants will grow in them which would not thrive so well if planted on the flat.

Great care should always be taken to see that no empty spaces are left behind rocks nor any shallow pockets of soil formed which do not communicate with the greater bulk of soil behind or below. Rock plants, though often of small size, usually have extensive root systems which penetrate far and wide through fissures and crannies in the stones. For this reason they must be given an ample rooting medium and the soil in the rock garden should not anywhere be less than one foot in depth.

If choice is available, the best aspects for a rock garden are south-east or south-west. Gardens facing due south tend to get too hot in summer for many plants, while those facing north tend to be too shady and too cold. Nevertheless successful rock gardens can be made in every aspect, if sufficient care is taken in both construction and choice of plants.

No hard and fast rules can be given on the actual design to be followed as in this nature can be the only guide. A visit to a

rocky hillside will prove far more instructive than any amount of verbal information. Faults to avoid are the rearing of rocks on end like tombstones, their haphazard arrangement, like currants in a bun, and the use of too many small pieces.

ROD A measure of length. A rod is $16\frac{1}{2}$ feet and is synonymous with pole and perch. Often these terms are used loosely for square rod, square pole or square perch. Thus if it is stated that an allotment is to be 10 rods in size, the meaning is that it is to be 10 square rods or $\frac{1}{16}$ of an acre.

ROGUE Any plant that is not true to the character or characters which it is supposed to possess, e.g. if a batch of pink antirrhinums is raised from seed, and it turns out that a few of the plants are producing red flowers, these are termed rogues. It is an important part of the seed-grower's technique to remove rogues from stock beds before they have a chance to ripen any pollen, and possibly contaminate other plants which are true to type. Even plants which are propagated by some vegetative means, such as by cuttings, layers, or grafts, may occasionally differ from the type and must be removed. Another possibility is that rogues may be accidentally mixed with stock that is true, e.g. when seed potatoes are being sorted and graded in the warehouse it is not difficult for a few tubers of one variety to get mixed with the tubers of another variety and remain undetected. These tubers will, of course, produce rogue plants the following year.

ROLLER Rollers are made of cast iron, concrete, or wood, and vary greatly in size, shape and weight according to the purpose for which they are required. Heavy rollers, made of iron and weighted with water or sand, are only required on grassland used for sports, which undergoes, in consequence, a lot of heavy wear. Even so, they should be used with discretion, as too much consolidation of the soil may kill the grass. Such heavy rollers should never be used when the surface is really wet, nor are they of much value when it is absolutely dry, the right time to use them being when it is just

slightly moist. For use on pleasure lawns not intended for heavy sports, a roller weighing about 2 hundredweights is most suitable. This can be used occasionally during spring and summer after mowing the grass. On large areas of grass, horse-drawn wooden rollers are sometimes employed for the same purpose.

Spiked rollers, i.e. rollers made of metal or wood with nail-like spikes projecting from them, are used to loosen and aerate turf that has become too consolidated by hard wear or repeated heavy rolling. The spikes should be designed to penetrate about 2 inches into the turf and puncture it without tearing it unnecessarily. Early autumn is the best time for the use of spiked rollers, and the benefit obtained is increased if an immediate top-dressing of sharp sand or flint grit is given and brushed down into the perforations.

Light rollers are also sometimes used in the preparation of seed beds, particularly before the sowing of grass seed. However, in the garden, when only comparatively small areas usually have to be considered, this work is more often done by treading the soil than by using a roller. Whichever method is adopted, great care should be taken to choose a suitable occasion when the soil is drying out on top and readily crumbles without becoming pasty.

ROOT CUTTINGS Any cutting prepared from a root instead of a piece of stem. (See *Cuttings*, *root*.)

ROOT MAGGOT A somewhat misleading name applied to a small yellowish-white maggot which may be found in the roots or the stems of many different kinds of plant. Chrysanthemums are particularly liable to be attacked and so are lettuces. The maggot usually enters the plant by way of the roots or stem at or about soil level and then tunnels up in the pith. As a result the leaves wither and the whole stem may die without apparent cause until it is split up and the maggot is found within. The maggot is the larva of a small fly not unlike the carrot fly which lays its eggs on the soil near to plants that may act as hosts. One preventive is to dust the surface soil

occasionally with finely powdered naphthalene at about 2 ounces per square yard to prevent the flies from laying their eggs. Under glass the pest can be kept at bay by sterilizing the soil before use with steam, formalin or cresylic acid. Yet another possibility is to soak the soil, immediately before planting, with mercuric chloride solution—1 ounce mercuric chloride to about 10 gallons of water—but as this is a deadly poison it should be used with care.

ROOT PRUNING The shortening or removal of roots, usually with the intention of decreasing the vigour of a tree or shrub by depriving it of some of its supply of sap. At one time root pruning formed a regular part of the cultivation of fruit trees grown in restricted form, as for example cordons, horizontally-trained trees and fan-trained trees. Nowadays, the introduction of dwarfing stocks for many of these trees has reduced the necessity for root pruning, but it is still sometimes required.

The best time to do the work is in autumn and the method is to open a trench a foot or a foot and a half in depth, and about the distance from the main stem or trunk of the ends of the outermost branches. Then the soil is removed on the inside of this trench with a fork, and the roots are exposed without being injured. Some of the thickest roots are then severed, either close to the tree or a foot or so away from it according to the severity of the check it is desired to give. Meanwhile the finer roots are carefully preserved and are eventually laid out once more in a natural manner and covered with soil, which is trodden firmly over them. Some gardeners prefer to root prune only one half of the roots at a time, opening a semi-circular trench one year, and then completing the operation the following year. By this means they reduce the shock to the tree.

Very much the same effect as that produced by root pruning can be obtained by ringing. (*q.v.*)

ROOT ROT A number of unrelated diseases come under this general heading. All attack the roots of plants causing them to decay, as a result of which the plants them-

selves collapse and die. One of the commonest is caused by the honey fungus (*Armillaria mellea*). This gets its popular name from the honey-coloured parasol-shaped toadstools which appear on the surface round affected plants. Below soil level the fungus appears as black threads not unlike bootlaces and these attach themselves to the roots of plants and slowly destroy them. Trees and shrubs are particularly liable to be attacked, and privet is a frequent victim, though the real cause of the trouble is often missed as the bushes above ground merely appear to be withering and dying as though from drought. There is no cure for affected plants and these should be burned, but the disease can be prevented from spreading by watering the soil round healthy trees or shrubs nearby with a solution of 4 ounces of sulphate of iron per gallon of water. Good soil drainage will also help to keep the disease at bay.

Another kind of root rot, usually known as black root rot because it causes roots that are attacked to decay and turn black, is found most commonly on peas, violas and violets. With this, also, plants wither and die and the soil fungus is often not suspected. No remedy is known. Affected plants should be removed and burned and rotational cropping practised so that the same kind of plant is not grown year after year on the same ground.

A third kind of root rot is known as violet root rot because of the violet or purple-coloured mould which appears on the surface of decayed roots. This disease is found on carrots, beetroot, potatoes, seakale, chicory and asparagus amongst others. Precautions are exactly the same as in the case of black root rot.

ROOTSTOCK A term sometimes used by gardeners for the stock as distinct from the scion in a grafted or budded plant. Thus an apple may be described as grafted upon paradise rootstock. The word also has a botanical meaning and is used to describe rhizomes, particularly rather short or more or less erect rhizomes such as those found in many ferns.

ROSE COMB A curious disease of mush-

rooms which causes the caps to become deformed so that they have the appearance of a cock's comb. It is not due to any specific infection nor to attack by insects, but may be brought on by exposure to paraffin fumes. In consequence it is most likely to occur in mushroom houses that are warmed by paraffin stoves. If there is no other method of heating, great care should be taken to keep such stoves well trimmed and clean and to use only the highest grade paraffin. The disease can also be caused by spray fluids containing paraffin or petroleum oil and such sprays should never be used in the mushroom house.

ROSY RUSTIC MOTH The green caterpillars of this moth feed within the stems of certain plants, causing the leaves to wither and the stems to die. Potatoes are often attacked, and the caterpillars are also found frequently in dahlias and chrysanthemums. Sprays are useless as the caterpillars are completely protected within the stems. The only remedy is to cut off and burn all wilting shoots.



Caterpillar of rosy rustic moth

ROTATION The practice of varying the position of crops from one year to another so that the same crop does not occupy the same ground two years running. The pur-

pose of rotation is twofold — partly to reduce the risk of damage by diseases or pests peculiar to one kind of plant, and partly to make the best possible use of the plant foods in the soil. This latter idea is based on the observation that plants differ in their food requirements, some needing more of one and some of another. For example, most members of the cabbage family require heavy supplies of nitrogen, whereas root crops such as carrots, parsnips, turnips, and beetroots do not require so much nitrogen but need considerable quantities of phosphate. If, therefore, a plot is prepared for brassicas with plenty of dung, which is rich in both nitrogen and phosphate, it is likely that, when the brassicas have been cut, considerable quantities of phosphate will remain in the soil, perhaps sufficient, with a little addition, to carry a crop of carrots, parsnips, turnips or beetroots.

A strict rotation, usually based on a three-year succession of crops, is frequently adopted by farmers, and a somewhat similar scheme has been suggested for vegetable gardens. However, it is seldom possible in the confined space of a vegetable garden to follow any mode of rotation rigidly, as there are other considerations such as the amount of ground to be devoted to each crop.

A simple three-year rotation for the vegetable garden can be devised by dividing the ground into three approximately equal parts and devoting one mainly to brassicas, one mainly to potatoes and one mainly to root crops. The brassica plot receives a heavy dressing of animal manure or compost and the crops, in addition, are fed with a nitrogenous fertilizer while in growth. The potato plot receives a smaller dressing of animal manure and also an artificial fertilizer containing nitrogen, phosphate and potash with the phosphate in greatest quantity. The root crop plot receives no animal manure or compost, but a fertilizer containing nitrogen, phosphate and potash with particular emphasis on the last two. The following year the brassicas are grown on what was formerly the potato plot; the potatoes are grown on what was formerly the root crop plot, and

the root crops go to the former brassica plot.

It will be observed that this skeleton scheme makes no provision for a number of crops such as peas, beans and onions, or lettuces, radishes and other small salads. These can be variously associated with the other crops according to the requirements of the household and other considerations, such as inter-cropping and catch cropping, e.g. some salads may be grown on the brassica plot before the brassicas are planted and some peas and beans may be grown on the root crop plot, but in special trenches to which manure has been added. Onions are frequently grown on the same ground year after year, which gives quite good results provided the ground is well manured and does not become infested with the fungus that causes the white rot disease of onions.

ROTENONE The active principle in derris and allied insecticides. See *Derris*.

RUGOSE Wrinkled; a botanical term used mainly to describe leaves which have a wrinkled surface as in *Rosa rugosa*.

RUNNER A popular name for a stolon, i.e. a rooting stem produced at soil level. Some plants have the habit of producing runners freely and using them as a normal method of increase. A familiar example is the creeping buttercup, one plant of which is soon capable of throwing out sufficient runners to cover quite an extensive area of ground. Violets increase themselves in the same way, and so do most strawberries, though the alpine varieties do not produce runners.

The attitude of the gardener towards runners will depend upon the plant in question and the purpose for which he needs it. The buttercup runners are an unmitigated nuisance to him, and must be destroyed by every practicable means. The violet and strawberry runners provide ready method of increasing stock, but if not needed for this purpose, they should be removed at an early stage, as they tend to weaken the main plant and to overcrowd the bed.

Runners usually produce a succession of small plantlets along their length, each of which is capable of rooting and forming a new plant. When runners are used for propagation, it is generally advised that the number selected per plant should be strictly limited, usually to 5 or 6 per plant, and that only the first plantlet formed on each runner should be retained, the rest of the runner being removed. By this means really sturdy young plants are produced.

Runners are quite capable of rooting and making plants when left entirely to their own devices, but to make certain of it the gardener usually pegs the plantlets firmly to the soil, or holds them in position with a stone, and, moreover, sees that they are well provided with moisture should the weather become dry. Sometimes the runners are pegged down into pots so that, when rooted, they can be transferred elsewhere with a minimum of root disturbance. This is a favourite method with strawberries, and the pots are usually sunk to their rims in the soil round the plant, so that they do not dry out too rapidly.

It is generally advisable to sever rooted runners from their parents a few days before it is intended to transplant them elsewhere. This minimizes the shock which otherwise might be inflicted by depriving a plant of the food supplies which it gets from its parents and also, at the same time, damaging some of its own roots so that it is checked in the gathering of its own food supplies from the soil.

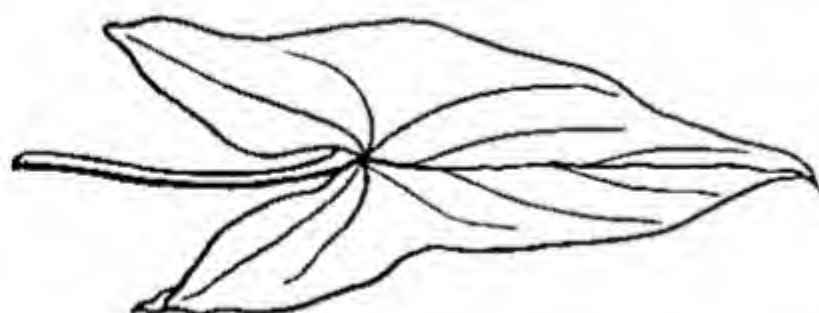
Great care should be taken only to select runners from good, healthy plants, and this is particularly important with strawberries, which often show a considerable variation from plant to plant, besides which some of the plants may be infected with virus disease which is passed on to the runners and the plants raised from them.

RUST A general term applied to a variety of diseases caused by different fungi which are alike mainly in the fact that they produce rusty-coloured outgrowths on the leaves or stems of the plants attacked. These outgrowths may be in the form of rust-coloured spots as with antirrhinum rust, carnation rust and chrysanthemum rust,

or larger rust-coloured pustules as with hollyhock rust and mint rust. Rose rust has the appearance of rather bright orange spots or patches on the undersurface of the leaves. The so-called rust of rhododendrons is not caused by a fungus but by the attacks of rhododendron bug (*q.v.*).

Almost all the rust diseases are difficult to control. The ordinary fungicides such as Bordeaux mixture, Burgundy mixture or colloidal copper, if applied frequently during the spring and summer, may give some measure of control but are not likely to check the disease completely. Treatment of this type should be supplemented by careful removal of all affected leaves or shoots which should be immediately burned. Rust-resistant varieties of antirrhinum have been produced and may be grown where the disease has proved particularly troublesome. Mint rust does not, as a rule, yield to any treatment and affected plants should be removed and burned.

SAGITTATE Arrow-shaped; a botanical term used to describe leaves which have two lobes projecting backwards giving them roughly the shape of an arrow-head.



A sagittate leaf

SALT The term salt is applied to any combination of an acid with a base, and in this sense most of the chemical fertilizers used in gardens are salts of one kind or another. Sulphate of ammonia is the salt of sulphuric acid and ammonium; nitrate of soda is the salt of nitric acid and sodium; nitrate of potash is the salt of nitric acid and potassium and so on.

More popularly the term salt is used for common salt or sodium chloride. This is the ordinary salt of the kitchen and table.

It is mainly used in the garden as a weed-killer, but for this purpose it has now been largely superseded by sodium chlorate which is considerably more effective and almost as safe to use. As a weedkiller sodium chloride is either applied dry to the weeds, at the rate of from $\frac{1}{2}$ to 2 pounds per square yard according to the type of weed to be destroyed, or the weeds are watered with a solution made by dissolving $\frac{1}{4}$ to 1 pound of salt in each gallon of water. Salt has little or no selective action, i.e. it will kill all plant life, for which reason it cannot be used to destroy weeds on lawns nor amongst growing plants.

Common salt is also occasionally used as an insecticide, particularly for destroying caterpillars on cabbages and other brassicas, for which purpose a solution of 2 ounces of salt per gallon of water is sprayed heavily over the plants.

A few crops appreciate small dressings of salt as a fertilizer, notably those crops which by nature inhabit seaside districts, such as asparagus and seakale. For these a dressing of salt at the rate of 1 ounce per square yard may be given in late winter or early spring. At this small rate the salt has no harmful effects on these particular crops.

SALTPETRE The popular name of potassium nitrate otherwise known as nitrate of potash. (See *Potassium Nitrate*.)

SAND This is chiefly of value for the cultivation of plants in greenhouses and frames, though occasionally it is used outdoors to lighten heavy soils. Sand usually has no manurial value, though in a few instances it may contain lime, usually in the form of crushed shells. It is, however, almost always used for its purely mechanical effect on the soil. It helps to keep the finer particles of soil apart and so improve drainage and aeration. For these purposes rather coarse and angular sand is to be preferred to sand that is fine and composed of smooth, round particles. The sand recommended for the John Innes seed and potting composts will grade from very tiny fragments up to pieces that only just pass through a $\frac{1}{8}$ inch mesh sieve. Such a sand may form up to a quarter of the bulk

of a seed or potting compost, according to the nature of the soil itself and the kind of plants to be grown in it.

Pure sand is also sometimes used as a rooting medium for cuttings. It has the merit of encouraging very rapid formation of roots, but it suffers from the drawbacks of containing no nutriment whatsoever, so that cuttings, if allowed to remain in it for any length of time after they have formed roots, will become starved, and also that it dries out rapidly so that frequent watering is essential in warm weather. When used in what is known as a warm sand frame, i.e. a propagating frame exposed fully to sunlight without any shading, and filled with pure sand without any addition of soil, it may be necessary to water two or three times daily during warm summer weather. Nevertheless it is possible to root many cuttings in such warm sand frames which could not be rooted so readily in any other way.

SANDSTONE One of the basic geological formations which occur in many parts of the country. Sandstone varies greatly in character, from soft sandstones which, when exposed to the weather, quickly break up into small fragments, to hard sandstones which will stand many years of exposure without appreciable effect except a gradual mellowing of colour. Hard sandstones of this type are particularly useful for the construction of rock gardens, garden walls, etc. They have the merit of weathering in a pleasing manner, of being reasonably absorbent and, for this reason, of encouraging the growth of plants. Sandstone is entirely free of lime and can be used where lime-hating plants are to be grown, for which purpose limestone would be unsuitable. In colour, sandstone varies from a comparatively light yellow to a deep brick red.

SAPROPHYTE Any organism that lives on other organisms that have died, in contrast to parasites which live on organisms that are themselves alive. Saprophytic fungi are often very useful to the gardener as they initiate the decay of much dead matter. If a compost heap is opened at an

early stage it will be found to contain plentiful quantities of the white, thread-like growths of saprophytic fungi. These are beneficial and can do no harm to living plants.

SAW The only saw required for genuine horticultural operations is a pruning saw with which to remove branches too thick to be cut off with knife or secateurs. Most pruning saws are made to cut in the reverse direction from an ordinary saw, i.e. when the blade is pulled towards the body and not when it is pushed away from the body. Frequently the blade is slightly curved. In all these saws the blade is comparatively narrow, and the whole saw is rather small—certainly not more than 2 feet in length. The correct method of removing a branch of a tree with such a tool is first to make a small cut on the underside of the branch about 1 inch above the point at which it is to be removed and then to cut from the top of the branch downwards at the actual point of severance. When the two cuts are about level the branch will break off cleanly and the remaining small 'snag' of wood, representing the difference between the level of the two cuts, can be removed without danger of the bark tearing. If a cut is made from the upper side of the bough without any preliminary cut below, the branch will commence to sag and break before the saw cut can be completed, and it is almost inevitable that a strip of bark will be torn away as it falls.

It is advisable to trim down the surface of saw cuts with a sharp pruning knife, as a clean cut heals up much more quickly than a ragged one. Some gardeners like to cover wounds made by saw cuts with some protective substance such as white lead paint, Stockholm tar, or warm grafting wax. The object of this is to prevent infection of the wound with any fungus or other undesirable organism. A slight drawback to any of these measures is that they tend to slow down the rate at which a healing callus is formed over the wound.

SAWFLY A general name given to a number of fly-like insects. The larvae of

several of these are troublesome in the garden and are often mistaken for caterpillars, i.e. the larvae of moths or butterflies. One of the most familiar is the apple sawfly the white maggot of which tunnels into the tiny apple fruitlets in June and feeds within them. As a consequence the fruits usually fall prematurely. Sometimes the maggots damage the skin of the tiny fruit without being able to penetrate to the flesh beneath. In such instances ribbon-like scars develop as the fruit swells. The damage caused by the apple sawfly maggot is often confused with that caused by the codling moth (*q.v.*). It is important to distinguish between these two pests as the remedy for each is quite different. The sawfly is best attacked with nicotine or HETP, applied about a week after the blossom falls, and again, if attacks have been serious in previous years, a week later. If poultry can be allowed to run under standard or half-standard trees in the summer they will pick up many of the grubs as they fall to the ground.

The maggot of another species of sawfly attacks roses, causing the leaf to roll up lengthwise into a tight coil. If the leaves are unrolled, a small greyish or green larva

will be found within. Spraying with DDT or nicotine will check the attack, but hand picking is usually necessary in addition, to destroy larvae which are already protected within the rolled leaves.

A small, creamy-white sawfly maggot is sometimes found feeding in plum fruits and the remedy in this instance is to spray with derris about a fortnight after the blossom falls. (See also *Slugworms*.)

SCAB A term which is applied to several quite distinct diseases. One of the most troublesome of these is the scab of apples and pears. It is caused by a fungus that attacks leaves, fruits, spurs and young shoots. Sooty blotches develop on the leaves particularly from midsummer onwards, while, on the fruits, black, sunken spots or patches occur and the fruits, if severely attacked, may crack or remain small and misshapen. The bark of the young shoots and of spurs may become blistered. The most effective remedy is lime sulphur, and several applications may be necessary in severe cases. As a rule two applications of lime sulphur at the full, or winter, strength are given before the blossom opens, the first at the green bud stage and the second



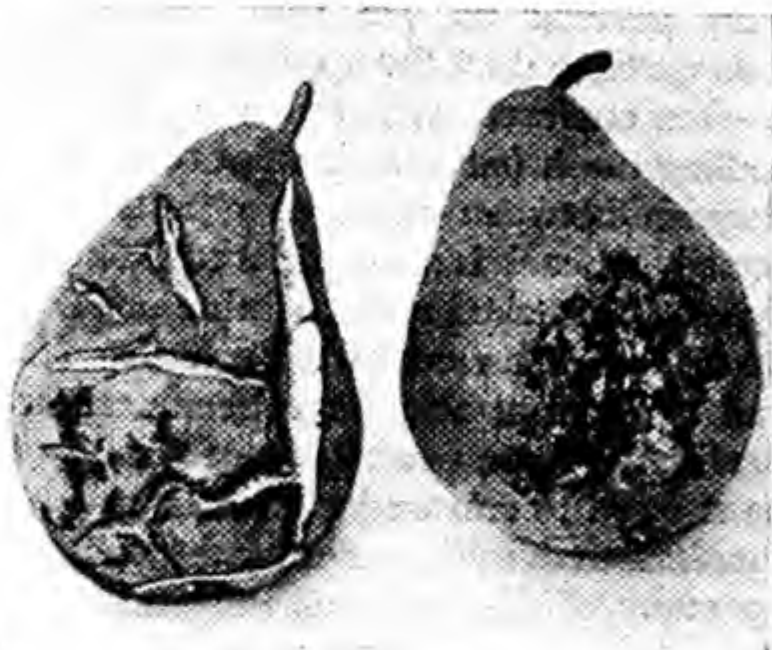
Apple fruitlets attacked by the apple sawfly

at pink bud (in apples) or white bud (in pears). A third application at the reduced or summer strength is given when the blossom has fallen, and sometimes two or three further applications at summer strength may be necessary at intervals during the summer. The leaves of some varieties of apple are scorched by lime sulphur. In no case is severe scorching likely to result from pre-blossom application, but the after-blossom applications may have to be omitted in the case of Beauty of Bath, Belle de Boskoop, Lane's Prince Albert, Lord Derby, Newton Wonder, Rival and Stirling Castle, or alternatively the spray may be used at about three-quarters the normal summer strength or dispersible sulphur be substituted for lime sulphur. Pears are often damaged by lime sulphur and some fruit growers prefer to use Bordeaux mixture for them. It is used at normal strength both before and after the blossom period. Bordeaux mixture may also be used on apples, but is liable to damage the foliage of Beauty of Bath, Cox's Orange Pippin, Lane's Prince Albert and Lord Derby.

A totally different disease is potato scab. This is caused by a fungus carried in the soil and it causes the skins of potatoes to develop rusty-looking patches or scabs. Only the skin is affected and the flesh is not attacked. In consequence scabby potatoes, while unsightly, are usable. The disease is most likely to prove troublesome on soil that is markedly alkaline, and excessive applications of lime may encourage it. Potatoes should be grown on slightly acid soil and on soils on which the disease has occurred it is a good plan to dig in grass clippings liberally prior to planting and to surround the planting sets with plenty of peat or leaf mould. Proprietary fungicides are advertised for treating the tubers prior to planting and these should be used according to manufacturer's instructions. It is desirable to reject all planting sets which show scab damage.

Yet another disease known as scab attacks gladioli, producing brown spots on the foliage. These spots are particularly numerous around soil level. In severe cases the plants may rot right off at the neck so that the leaves collapse completely. Dark

scabs with a gummy or varnished surface also appear on the corms but do not penetrate the flesh at all deeply. Corms that are badly affected should be discarded, while others less seriously injured may be dipped, prior to planting, for 5 to 10 minutes in a solution made by dissolving 1 ounce of calomel in a gallon of water. The solution must be stirred constantly to keep the calomel in suspension.



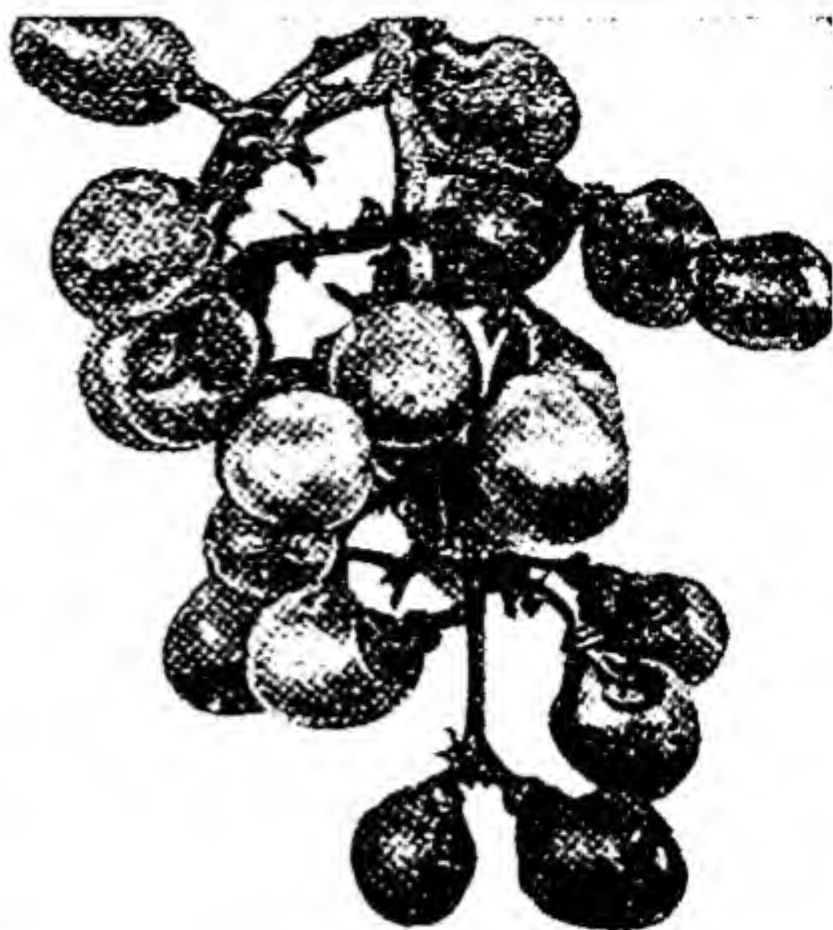
Pear scab

SCALDING A physiological disorder of greenhouse plants which may affect leaves, young stems or fruits. It is due to rapid fluctuations in temperature, draughts, hot dry atmosphere and fumes, particularly the fumes of paraffin or coal gas. Symptoms are browning and withering of leaf edges, the appearance of brown or whitish spots more or less evenly distributed all over the surface of leaves, withering and browning of young shoots and shrivelling and browning of fruits. It is not always easy to determine from the damage which of the several possible causes of scalding is responsible though, in general, scalding from fumes tends to take the form of a more or less even spotting or blotching, whereas scalding from the sun or a hot dry atmosphere is more likely to affect the edges of the leaves. However, an examination of the surroundings of the plants and a consideration of the weather and atmospheric conditions during the preceding few days will usually resolve such doubts. The remedy is to avoid the cause of the scalding when the plants will, as a rule, grow out of the condition.

Scalding of grapes may sometimes be mistaken for shanking (*q.v.*). In both disorders the berries turn brown and collapse but in shanking a careful examination will reveal that it is the stalk of the berry which has died first and that the collapse of the berry itself is due to the cutting off of its supply of sap. In scalding the stalk is, as a rule, unaffected and all the damage is on that side of the bunch which faces in a southerly direction.

SCALE INSECTS A great many related insects pass under this general name. Their characteristic is that they are protected, at any rate during some part of their life cycle, by a scale. They attach themselves limpet-fashion to the branches, stems or leaves of the plants to be attacked and they then suck sap from them. The scales which cover them vary considerably in size, colour and shape. Brown scale, which is common on many greenhouse plants, is dome-shaped, brown in colour and up to $\frac{1}{8}$ inch in diameter. Mussel scale, which is common on fruit trees, is oval in shape, not unlike the familiar mussel after which it is named but only about $\frac{1}{8}$ inch in length, and the colour is grey or blackish. One part of the life cycle of the familiar greenhouse white fly is in the form of a disk-like scale, perhaps one twelfth of an inch in diameter, attached to the underside of the leaf. Often leaves or stems which are attacked by scale insects become coated with a sticky substance, and sooty mould grows on this so that the shoots have a blackened appearance.

In the open, fruit trees, aucubas, rhododendrons, yews and beeches are particularly liable to be attacked, while under glass, orchids, ferns, palms, camellias and all kinds of foliage plants are favourite victims of the scale insects. Fruit trees can be cleared by spraying in winter with a tar oil winter wash. Under glass fumigation with nicotine or calcium cyanide will kill scale insects, or plants may be sprayed with nicotine and soft soap, petroleum emulsion insecticide, or DDT oil emulsion insecticide. In small attacks, the scales can be removed one by one with the point of a knife,



Grape scald

and the stems or leaves washed subsequently with soapy water.

SCAPE A flower stem growing direct from the ground and bearing no leaves. The flower stems of *hippeastrum*, *amaryllis* and *clivia* are of this character.

SCHRADAN The popular name of bis (bisdimethyl-amino-phosphorus) anhydride, an organic chemical used as a systemic insecticide, particularly for the destruction of sucking insects such as aphides, capsid bugs, red spider and thrips. It can be applied as a spray to the aerial parts of the plant, or it can be injected into the soil or be applied in capsules to the soil. It is absorbed by plants and passes in their sap to all parts thus rendering them poisonous to certain insects. The chemical is also poisonous to human beings and other warm blooded creatures, but it is decomposed, and so ceases to be toxic, a few weeks after being applied. It is sold under various trade names, and manufacturer's instructions regarding dose and method of application should be obtained.

SCION Any shoot or bud separated from its parent plant and joined to another plant

with the object of forming a union with it, as in grafting or budding. The scion is that part of the grafted or budded plant that provides all the aerial shoots or branches, in contrast to the stock which is that part of the partnership which provides all the roots.

SCISSORS There are several kinds of scissors made specially for various horticultural tasks. Of these perhaps the most important are vine scissors which resemble barber's scissors in having very tapering blades. The purpose of vine scissors is to thin out the tiny fruits in the young bunches of grapes and so prevent overcrowding. Special flower-gathering scissors are also manufactured, some of which grip the flower after it has been cut.

SCLEROTINIA ROT A name given to a series of diseases all caused by the same fungus, though the symptoms vary considerably according to the type and age of the plant attacked. For example tomato plants when attacked by this fungus develop a decay of the main stem at or near soil level, a condition usually referred to as stem rot or collar rot. Roots in store decay completely to a wet slimy mass upon which a dense white mould appears. There is no remedy for this disease and affected plants or roots should be burned. As the disease is most likely to occur in wet or stuffy store houses, care should be taken to see that the conditions are both dry and airy. If the disease appears in tomato houses, the soil should either be removed after the crop has been gathered or should be sterilized with steam or formalin before it is used again.

SCREE, see *Moraine*.

SCRIM A fine cotton material sometimes used for shading plants in the greenhouse. For this purpose it is employed in the same way as tiffany. (See *Tiffany*.)

SCYTHER Many years ago the scythe was one of the most important tools of the garden for it was the only one available for the cutting of grass. Normal grass cutting is now done with one or other of the many

patterns of lawn mower on the market, or with garden shears, but a really sharp scythe wielded by a skilled operator is still the best tool with which to make the first cutting of young grass raised from seed. The reason for this is that there is far less danger of dragging the grass out by the roots with a scythe than with a mowing machine. Once the grass has become established, its roothold is sufficiently secure to withstand the slight pulling effect of even the sharpest lawn mower.

Though scythes vary considerably in design there are really only two principal types—what is sometimes known as the bramble scythe with a comparatively short and stiff blade, and the mowing scythe with a longer and thinner blade. The bramble scythe, as its name implies, is used for cutting down rough weeds, brambles, etc., while the mowing scythe is used for grass. In both tools it is important that the scythe blade and the handles by which the scythe is held are set in the correct manner for the person who is to use it. Setting will differ according to the height of the person, and should be such that the blade can be swung easily and freely with the arms extended and the blade just touching the soil and flat with it. Scything is not an easy art to acquire, and certainly not a task which the unskilled amateur should attempt without instruction.

SEA-KALE POT An earthenware pot used for forcing sea-kale. (See *Forcing*.)

SEAWEED This is valuable as a manure for the land and great quantities are gathered in many parts of the country. The most suitable seaweeds for this purpose are the bladder wrack or fucus, which is also the commonest of all seaweeds on most of the coast of this country, and the long, broad, ribbon-like seaweed known as laminaria. Such seaweeds can either be dug in wet, as gathered, at the rate of about 1 hundredweight to 8 square yards, or they may be spread out thinly in the sun to dry, and then be dug in at about one-third this rate, namely 1 hundredweight to 24 square yards. Wet seaweed, if stacked, rots very quickly, and, though it is still suitable for

use as a manure, the smell is most unpleasant. Dried seaweed, on the contrary, if built into cone-shaped or beehive-shaped stacks, can be stored for long periods without rotting and without an unpleasant smell. Seaweeds vary considerably in their analysis, but an average wet sample may be expected to contain about $\frac{1}{2}$ per cent. nitrogen, $\frac{1}{10}$ per cent. phosphoric acid, and 1 per cent. potash. It will be observed that the ratio of potash to nitrogen and phosphoric acid is unusually high for a bulky manure—certainly much higher than in any animal droppings.

SECATEURS The powerful scissor-like tools which are so frequently employed for pruning. Secateurs vary greatly in design, some types having one cutting blade only, which presses down on an 'anvil' made of soft metal or fibre, while some have two cutting blades each curved like a parrot's bill, or one sharp curved blade passing alongside another more obtuse-edged blade. There are also more elaborate types in which a cutting blade is drawn down and across the branch to be cut, with a guillotine action. All these different patterns have some points in their favour and the only real essentials are that the tool shall be capable of making a clean cut without bruising and shall be sturdy enough to sever a fairly stout branch, certainly one of finger thickness, without buckling or twisting in any way.

There is a tendency amongst expert gardeners to denigrate secateurs on the score that even the best of them are incapable of producing such clean cuts as those made with a sharp pruning knife expertly handled. This no doubt is true, but it is equally true that a good pair of secateurs is comparatively fool-proof to use, whereas the best of knives is capable of working havoc in inexperienced hands, particularly on the right thumb. For this reason secateurs are certainly a better proposition for the novice.

SEED BED Any piece of ground specially prepared for the reception of seeds. This will usually imply that the surface soil

has been broken down fairly finely and made level. If these precautions are not taken, it will be difficult to ensure that seeds are all covered to approximately the same depth, and, without this, irregular germination is almost certain to occur. See also *Tilth*.

SEED BOXES Any boxes in which seedlings are raised. As a general rule, seed boxes are rather shallow, a common measurement being $14\frac{1}{2}$ inches by $8\frac{1}{2}$ inches by 3 inches. Old kipper boxes make excellent seed boxes. The one essential is that

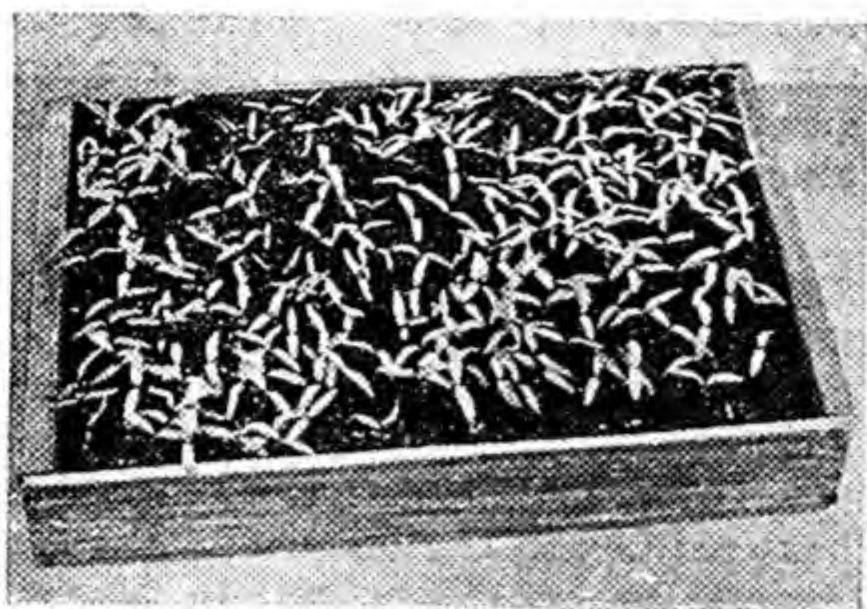


Firming the compost in a seed box

there must be a ready outlet for surplus water in the bottom of each box. As a rule the bottoms of such boxes are made with two or more slats of wood, and there should be a small space between these slats through which moisture can escape. When preparing seed boxes for sowing, a row of broken pots (crops) should be placed over the space or spaces, and these should be further covered with some of the rough rubble left in the sieve when preparing seed composts. These precautions are necessary to prevent fine soil from being washed down into the spaces and blocking them up.

If seed boxes are not protected in some way, they will decay after a year or so. Creosote is not a suitable preservative for this purpose, as the fumes which it is liable to give off when warm are harmful to plants. The best chemical for preserving seed boxes is copper naphthenate which is sold under proprietary names. This has no harmful effect on plant growth and is a

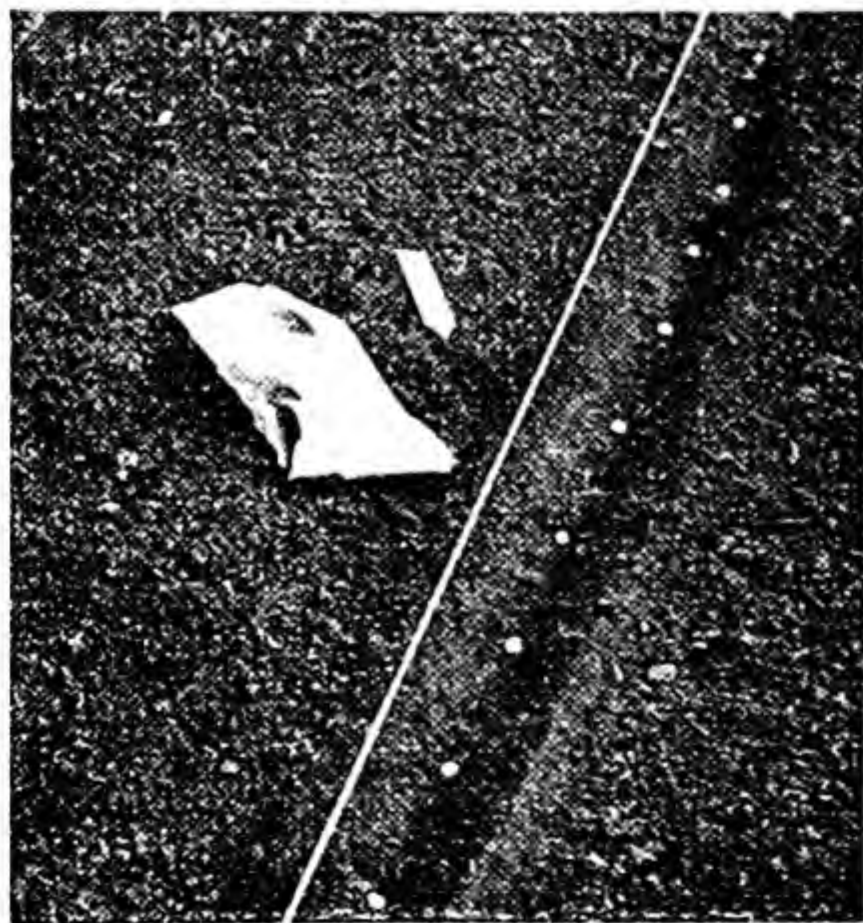
more effective wood preservative than creosote.



Young seedlings well spaced out in a seed box

SEED DRILL The shallow furrows in which seeds are usually sown. The name is also applied to the machines developed for the purpose of sowing seeds in straight lines.

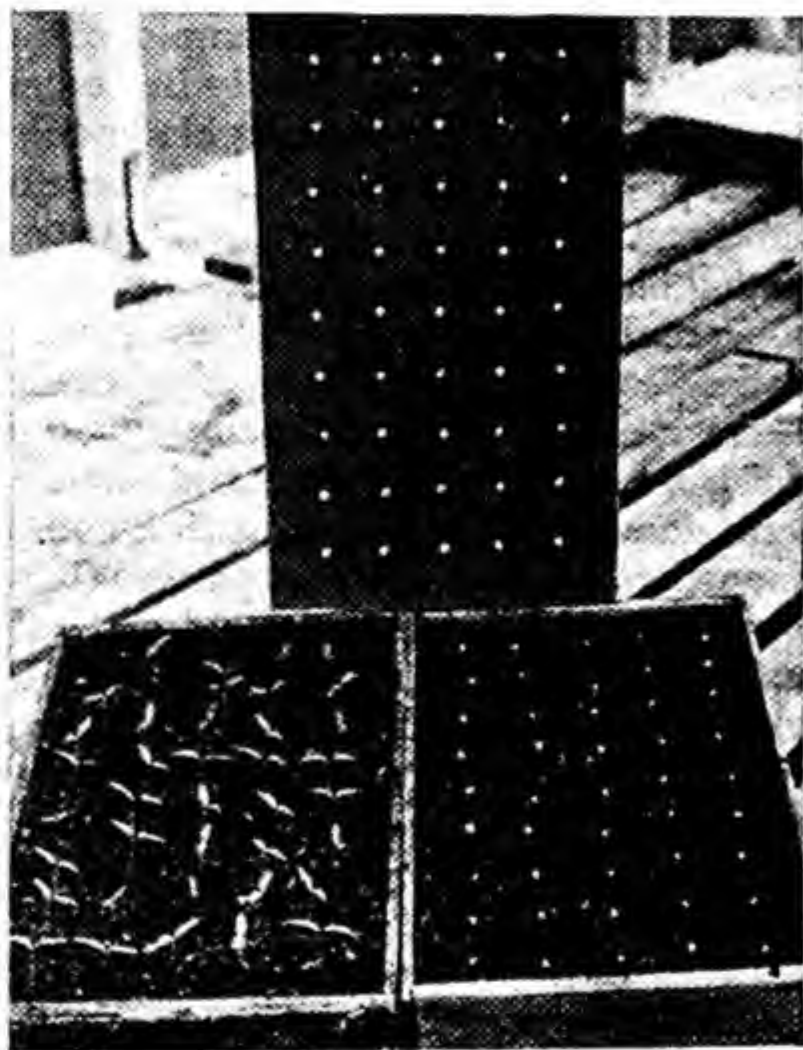
Seed drills in the garden are usually drawn with the point of a draw hoe, though other tools are sometimes employed and for small drills a pointed stick may be used. A little skill is necessary in order to draw drills which are straight and of even depth throughout. A garden line or the edge of a plank should be used to ensure straightness, while to keep a level depth it



Peas sown in a seed drill

is necessary to hold the hoe firmly in both hands and use it with rather swift motions, so overcoming any minor inequalities in the soil. Seed drills will vary in depth according to the nature of the seed to be sown in them, a rough guide being $\frac{1}{4}$ inch deep for the smallest seeds and 2 inches deep for the largest seeds such as beans, the average being $\frac{1}{2}$ inch deep. Seed drills are refilled after sowing with the soil removed from them, which may be done by gently drawing the back of a rake across them.

Mechanical seed drills, i.e. tools made to do the whole work of sowing and covering, vary greatly in design and usefulness. The



By using a spacer, tomato seeds can be sown thinly

simplest is the so-called brush drill in which a brush with stiff bristles revolves in a hopper containing the seeds, and pushes them through a small hole in the side or back of the hopper, whence they fall down a channel into a drill made by a suitably shaped share. More elaborate seed drills make use of holes which may be varied in size to suit the size of the seeds and the rate at which they are to be distributed, the seeds being agitated in some manner to prevent them blocking the hole. Models

have even been developed which are capable of sowing seeds individually and spacing them at any desired distance.

SEED LEAF The first leaf or leaves produced by a seed when it germinates. Seed leaves are also known as cotyledons (*q.v.*).

SEEDLINGS A term rather loosely applied in gardens not only to very young plants which have been raised from seed, but also, sometimes, to much older plants which have been raised from seed, to distinguish them from other similar plants which have been raised by vegetative means. This can sometimes be of considerable importance, e.g. a seedling apple will always differ from its parent or parents and is, therefore, an entirely new individual, whereas an apple raised from a graft will resemble its parent in all essential details and is not in the same degree a new individual. The same thing applies to the seedlings of a great many other plants which have been highly developed, roses, for example, or chrysanthemums. The wider variation of the seedling often provides the plant breeder with valuable material for the selection and the building up of new types.

SEED PROTECTOR Any device for protecting seeds and seedlings, particularly from attacks by birds. The simplest of all seed protectors is black thread stretched, a few inches above the soil, between sticks thrust firmly into it. Birds seem incapable of distinguishing these threads clearly, and, flying into them, are frightened away. More permanent protectors can be formed of fine-mesh wire netting bent in the form of an inverted letter U and placed over the seed rows. String netting is also used for the same purpose, particularly diamond-mesh nets of the type used by fishermen. With these a large area of the ground can be covered very rapidly.

SEED SOWING The correct sowing of seed will have very great bearing on the degree of success obtained with it. There are three essentials for good germination, provided the seed itself is fertile. They are

moisture, warmth and air. With seed sown in the open ground, moisture will usually be provided by natural rainfall, though



Seed Sowing

occasionally seed beds may have to be watered. Under glass, moisture will have to be given by the gardener and care should be exercised to provide enough but not too much, and also, when watering in, not to disturb the seed or tiny seedlings nor to beat the surface soil down too closely as this would deprive the seed of air. Outdoors, the gardener will be dependent on natural warmth provided by sunshine, though he may intensify and trap this by the use of cloches and portable frames. Under glass, warmth will be more under the gardener's control and again care should be exercised to use enough but not too much. Excessive heat may prevent germination or cause weak growth. No



Sowing small seeds in a pan

general directions regarding ideal temperature can be given, as this will vary greatly from one plant to another. As some guide, however, it may be stated that few seeds will germinate in temperatures below 40 degrees Fahrenheit. The seeds of many plants from temperate regions will germinate in a temperature of 50-60 degrees Fahrenheit, but seeds of some plants from tropical regions may require a temperature of 75 degrees or more.



A seed pan covered with a sheet of glass

A sufficient supply of air can only be ensured by using a suitable soil mixture containing enough sharp grit to keep it open. Even the best of seed composts can be deprived of air if they are overwatered, as the water will fill up all the spaces between soil particles, and drive out air. Under these conditions seeds and seedlings will literally be drowned.

A suitable compost for use in pots and boxes for all kinds of seeds is that known as the John Innes seed compost (see *Compost*).

Outdoors, seed beds must be well broken down with ork and rake before sowing, and all large stones should be removed from the surface. This work should be done when the soil is reasonably dry on the surface. If it is too wet, it will be impossible to work on the bed without consolidating the surface too much, and so depriving the seeds of air. Nevertheless, the seed bed must be fairly firm, and for this purpose it should be trodden carefully or rolled with a light roller.

There are two ways of sowing seeds, one broadcast and the other in drills (see *Broadcast* and *Drill*).

The correct depth of covering will vary according to the size of the seed. A general rule is to cover seeds with twice their own depth of soil, i.e. seeds which are $\frac{1}{8}$ inch in diameter will be covered with $\frac{1}{4}$ inch of soil. However, this depth may be a little exceeded when sowing very small seeds in the open ground, as it is practically impossible to draw drills less than a $\frac{1}{4}$ inch in depth.

Seeds should always be sown thinly, as overcrowding of seedlings will weaken them considerably. The larger seeds may even be spaced out separately $\frac{1}{2}$ inch or more apart, according to their size, and another method is to sow seeds in small pinches of 3 or 4 seeds every 2 or 3 inches, in the drills. Then if all the seeds germinate, all the surplus can be removed and one seedling left standing at each station.

Whatever method of sowing is used, some thinning out is likely to be necessary in the early stages, or alternatively some or all of the seedlings will have to be pricked off to prevent overcrowding.

It is a common practice to cover seedlings under glass with a pane of glass and a sheet of paper—the former to check loss of moisture and the latter to keep the seeds dark and also to check evaporation. This is good policy provided the paper is removed at the first sign of germination. The seedlings must have light for them to be sturdy, and the pane of glass itself must be tilted a little at the first sign of germination, and removed entirely a few days later. Though the glass protection is beneficial to the seeds, it is harmful to the seedlings.

SELECTIVE WEED KILLER A weed killer which will kill certain kinds of plant but will leave the other plants unharmed. Two popular hormone weed killers of this type are 2:4D and MCPA (*q.v.*). These kill many broad leaved weeds but do not kill grass. Search is being made for selective weed killers which have the opposite effect, i.e. kill grass but not broad leaved plants.

SELF This term is used by some specialist flower growers to describe flowers which are of one colour throughout in contrast to other varieties of the same kind of flower, which are of two or more colours, e.g. self

carnations are of this character in contrast to fancy carnations which have one ground colour with markings of a contrasting colour.

SELF-FERTILE Any plant which is capable of producing seeds when fertilized with its own pollen. In garden practice the term is most used in connexion with fruit growing, and is of importance because so many varieties of fruit are not self-fertile, i.e. they will only produce seeds (and therefore only produce a crop of fruit) when fertilized with pollen from another variety of the same kind of fruit. This can be a drawback, particularly in small gardens in which it is not desired to grow several different varieties of the same kind of fruit.

SELF STERILE, see *Sterile*.

SEMI-DOUBLE A rather loosely defined term which may be applied to any flower which has more than the normal number of petals but has not had all its stamens and pistils changed into petals as with a fully double flower.

SEMINAL By seed. Thus seminal propagation means propagation by seeds.

SEPAL One of the separate leaves forming the calyx of a flower.

SEQUESTROL A trade name for certain organic chemical complexes used for curing mineral deficiencies in soils.

SESSILE Not stalked; a botanical term used in the description of leaves and flowers which have no stalks.

SET A term applied to certain tubers and corms used for planting. Thus potatoes which are to be planted are often referred to as sets, and so are shallot bulbs used for the same purpose.

Fruit blossom is said to be set when it has been fertilized and is commencing to form fruit.

SEWAGE SLUDGE Wet sludge from sewage beds can be used as a substitute for farmyard manure at rates of 10 to 20 cwt.

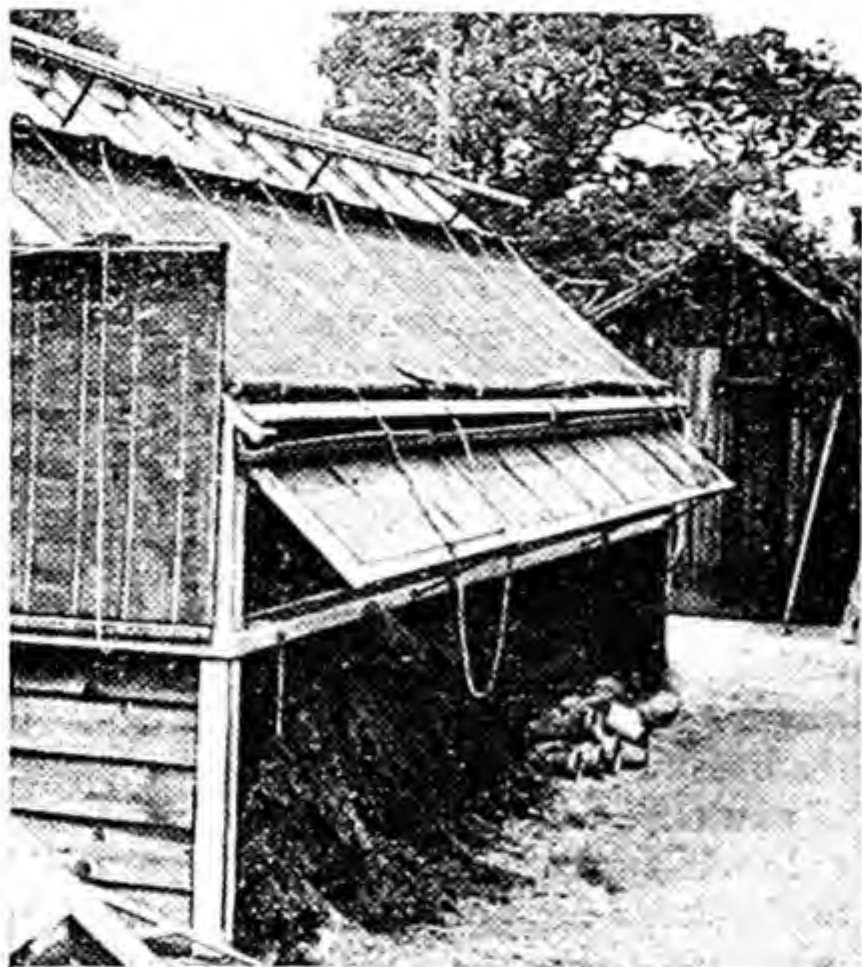
to 20 square yards. It is, however, a rather unpleasant material to handle. Many sewage works prepare dried sewage sludge but as this varies greatly in quality it should always be purchased against its published analysis. A good sample may have 2 per cent nitrogen and 1.5 per cent phosphoric acid and therefore be about twice as rich as horse manure.

SEX Flowering plants exhibit the characteristics of sex, i.e. they produce both male and female organs, the purpose of the female being to produce seeds, and of the male to fertilize the female egg cells or ovules. The essential male organs are known as stamens and consist of anther and filaments, while the essential female organs are known as pistils and receptacle, the latter containing the ovary or ovaries in which seeds are developed. A great many plants produce flowers containing both male and female organs, but in some kinds of plants certain blooms have male organs only while others have female organs only. Such plants are known as monoecious. In other instances male and female flowers are borne on separate plants and plants of this character are termed dioecious. Those producing male flowers only are referred to as male plants, those with female flowers only as female plants.

SHADE Although light is essential to all plants with the exception of mushrooms and other fungi, plants vary greatly in their light-requirements, and excessive light may damage them. In consequence the gardener must learn to distinguish those which require a certain amount of shade, either all the time or at certain stages of their development. This will apply to plants grown in the open and even more to plants grown under glass, where the effect of strong sunshine can be especially harmful. In fact, in the greenhouse some form of shading is almost always required in high summer, even for plants which normally like direct sunshine. This is because of the intense heat which can be developed under glass. Excessive shading, however, can do as much harm as excessive sunshine. The latter will result in scorched and yellowed foliage and stunted growth, whereas too

much shade will result in attenuated, weak growth and pale green or yellowish foliage.

Methods of providing shade under glass are by coating the glass with some liquid such as whitewash, which will break the direct rays of the sun; by pinning up some



Roller blinds for shading a greenhouse

thin material such as tiffany or butter muslin inside the greenhouse, or by covering the glass outside the greenhouse with blinds made of hessian, canvas, or split bamboo cane. Temporary shade is sometimes provided by laying sheets of newspaper over individual plants, or boxes, pans and pots of seed. Whatever shading is used, it should be of a kind which can easily be removed when the need has passed. Blinds should be mounted on rollers so that they may be quickly pulled down or wound up again. So-called permanent shade of the whitewash type should be so prepared that it can be readily washed off when no longer needed, though it must be sufficiently resistant to moisture to withstand the normal effect of rain for at least a few months. This apparent contradiction can be overcome by mixing a small quantity of white of egg or size with the whitewash, just sufficient to give it a slightly glue-like character.

In the open garden, shade for plants that

require it may be provided in a variety of ways: by erecting walls which will give almost full shade on their north face, and partial shade on east or west faces; by planting trees (though if this is done it must be observed that plants beneath the trees will have to compete for food and moisture with the tree roots), or by erecting temporary or permanent screens with wattle hurdles, hessian, evergreen boughs and a variety of other materials.

Cuttings that have not yet formed leaves will usually require greater shade than the plants from which they have been taken, the purpose of this being to reduce the evaporation of moisture from their leaves and stems, while they are without roots. For shading cuttings in frames, a useful device is the lath light, i.e. a framework of wood, made to fit the frame, with ordinary builder's laths tacked across it, a small space being left between each lath. These lath lights, placed over the cuttings in place of ordinary glass lights, will allow free circulation of air, but will break the force of direct sunshine.

SHANKING A common disorder of grapes which attacks the fruits as they approach the ripening period. The small



A bunch of grapes affected by shanking

stalks by which the berries are attached to the cluster wither and die. As a result the berries are deprived of sap and quickly wither and turn brown. The disease should not be confused with the damage caused by scalding. Differences are described under that heading. Shanking is a physiological disorder which may occur when the soil in which the vines are growing becomes impoverished or waterlogged. Frequently it is necessary to remake the borders in order to get rid of the trouble. When this is done drainage should be attended to with care and the soil used for the border must be well supplied with humus and plant foods.

SHARPENING A sharp edge to some garden tools is very important if good work is to be done. This is most notably so with knives used for pruning, grafting, budding and the preparation of cuttings, the reason being that ragged cuts made with a blunt knife take much longer to heal than clean cuts made with a really sharp blade. In order to ensure an adequate degree of sharpness, two things are essential—first a blade made of good, well-tempered steel, and secondly, correct sharpening. With knives, this sharpening can be done with a whetstone or an oilstone, though the latter is by far the more efficient.

The art of using any type of stone correctly is one that some people do not find easy to master. The blade must be held at a slight angle to the stone; the angle must be neither too steep nor too flat. If it is the former, the blade will be given a bevelled edge similar to that of a chisel, and this will not make a sufficiently fine cut. If, on the contrary, the blade is held too flat, the edge will become too thin and weak like that of a razor and will not stand up to the comparatively hard task of cutting through wood. The second point is that, as the blade is pushed down the stone, the angle must be maintained and not altered. The tendency with novices is to sweep the blade along the stone in such a way that the further it gets away from the body, the steeper the angle becomes. This rocking motion, if continued, will give a rounded instead of a smoothly bevelled edge and will prevent anything approaching real

keenness. The third point to be observed is that the stone must be sufficiently fine for the job. A coarse stone, such as that used for scythe sharpening, is no use, for example, on a pruning knife, which must be sufficiently smooth-edged for such work as grafting and the preparation of cuttings. So important is the question of the fineness of the edge for work requiring a really clean finish, that occasionally an oilstone is used to give the final touches to knives required for grafting and the preparation of cuttings. The oilstone is used in the same way as the whetstone, with the difference that it is moistened with thin machine oil or soap and water.

The sharpening of scythes, sickles and hooks, is always done with a whetstone sometimes made of hard sandstone, but more commonly these days, of Carborundum. When using this it is the stone that is moved and the blade is held still. Once again it is important to hold the stone at the correct angle to the blade—neither too steep nor too flat—and to maintain this angle throughout the sweeping movement around the blade.

Some gardeners do not take much trouble over the sharpening of such tools as hoes and spades, but if these tools are kept reasonably sharp, they do much better work and the labour of using them is considerably reduced. For all these purposes a file is the most suitable tool. Spades can be sharpened to a rather blunt edge like that of a chisel, as this will wear for a fairly long time, but with hoes it is better to give a more acute edge like that of a knife and to use an old, rather worn file for the purpose, (or, better still, one of the special files that are sold for sharpening saws) so that the edge is fairly fine and not ragged. Moreover the file may with advantage be kept in the pocket while hoeing, so that the edge can be touched up from time to time.

The sharpening of shears is also best done with a very fine file, and the blade should be fixed firmly in a vice or in some other convenient manner, while the sharpening is being done. Stones with metal guides, to maintain the correct angle are also available.

Axes and billhooks may also be sharp-

ened with a fine file, though a much better job is done if they can be put on to a proper grindstone. Once again it is necessary to insist on the importance of getting the right angle for grinding. It should be rather more obtuse than that for a knife, but not so blunt as that for a spade.

Sharpening of lawn mowers is really a task for special machinery, as all the blades of the cylinder must be ground to exactly the same level and this cannot be conveniently done with either a file or a stone.

SHEARS Large, scissor-like tools for trimming hedges, cutting lawns, etc. Shears are of many different patterns including short-handled shears for hedge-trimming, long-handled for cutting the edges of lawns, and spring-handled shears, not unlike those used for shearing sheep, which can be operated with one hand.

Ordinary hedging shears are often made with a semi-circular indentation towards the base of the blades. This is to facilitate the cutting of fairly stout stems. They are also always made with their handles cranked at a slight angle from the blades. When cutting the top of a hedge the shears should be held so that the handles slope downwards when the blades are horizontal. When cutting the sides of the hedge the handles should slope towards the user when the blades lie flush against the hedge. The sharpening of shears is a skilled operation which should only be undertaken by those who have the necessary tools available.

SHINGLE Any smoothly worn stone of small size may be given this name. The term is generally reserved for the water-worn stones found on sea beaches and at the margins of some rivers. Shingle is occasionally used in gardens as a surfacing material for paths, but is not very satisfactory as it cannot be compacted, and remaining loose, is exceedingly tiring to walk on.

SHODDY The refuse from a woollen factory. It may consist of anything from fragments of wool to small pieces of woollen fabric. Shoddy decays slowly in the soil, producing humus and at the same time liberating small quantities of nitrogen. It

is, in consequence, a slow acting bulky manure and can be used in much the same way as animal manures, such as those from stable and farmyard. Unfortunately it is not a material which is often available for the amateur, as supplies are limited and are usually contracted for by commercial growers and market gardeners. However, when shoddy can be obtained, it can be dug in at any time of the year at the rate of $\frac{1}{2}$ to 1 pound per square yard. Analysis varies considerably and may be anything from 5 to 15 per cent. of nitrogen.

SHOT BORER A general name given to a number of small beetles and also to their small, legless white grubs which bore their way into the wood of fruit trees and some ornamental trees, riddling them with tiny tunnel-like holes. The damage is not unlike that caused by the 'woodworm' so familiar in the home. Shot borers are most likely to be troublesome on trees that are already in poor health and every effort should be made to correct the conditions which are causing such general ill health. In addition all infested wood should be cut out and burned and pruning wounds should be protected with grafting wax or Stockholm tar.

SHOT EYE A term applied, when propagating roses by budding, to those buds which do not remain dormant the first summer but produce shoots. As a rule such premature growth is not looked on with favour as the growing shoots are more liable to be killed by frost during the first winter than are the dormant buds.

SHOT-HOLE BORERS Certain species of small beetles and their larvae tunnel into the bark and wood of many trees and shrubs and riddle them with small channels. Bad attacks may result in the death of a branch or even of a whole specimen. Weakly trees are most likely to be attacked. There is no satisfactory method of attacking these beetles and their larvae with insecticide, but good cultivation, including proper drainage of the soil, will help to keep them at bay. All attacked branches should be removed and burned. Wounds made in pruning should be painted with white-lead paint.

SHOW BOARD (Show Box) Boards or boxes on which certain flowers are exhibited. At one time the show board and show box were very largely used, but they have gradually been superseded by more 'natural' means of display, such as arrangement in vases or bowls. Nevertheless there are still classes at many shows for flowers shown on exhibition boards or in boxes, and rigid rules are laid down concerning the size and form of these boards or boxes. The principal flower concerned is the rose. See *Exhibition Boards*.

SHOVEL Shovels are of several different patterns and are alike in having a large and comparatively light spade-like blade curved upwards at the edges. Some patterns have a blade which is rounded or pointed, and some a blade which is square-ended, this last type being most useful for garden work. This type of square-ended shovel is often known as the London shovel in contrast to the rounded or pointed shovel which is known as a navvy's shovel. Shovels of all types are used for scooping up loose material such as sand, gravel, stones, coke, coal

A London shovel



or even the loose soil in the bottom of a trench when ground is being deeply dug.

SHOT HOLE DISEASE This name is apt to be a little confusing to fruit growers



Shot hole disease of peaches

as it is applied both to a symptom of bacterial canker of cherries and plums (*q.v.*), and also to a quite distinct fungal disease of peaches. In both these, clean round holes appear on the leaves as if punched out. The shot-hole stage is a distinctive phase in bacterial canker and treatment should be on the lines directed for bacterial canker as a whole. In peaches, shot hole is caused by a fungus which can be controlled by spraying the trees in late winter, just as the buds begin to swell, with Bordeaux mixture or winter-strength lime sulphur. A further application of lime sulphur can be given at a slightly reduced strength when the flower buds show pink.

SHRUB A term which may be used for any ornamental plant with woody stems and branches, but without a tree-like trunk. It may be of any size from a few inches to several feet.

SHRUBBERY (Shrub Border) The term shrubbery was applied to any piece of ground mainly or entirely devoted to the

cultivation of crops. It is a term which has acquired a bad connotation, because too often during the nineteenth century shrubberies were mainly planted with large-leaved evergreens, such as laurels and aucubas, and became heavy and dull, with little decorative merit as a result. Because of this unfortunate association the term has tended to be dropped and replaced by shrub border, but in fact the two terms are practically synonymous, with the possible exception that shrub 'border' does suggest a plot of ground longer than it is broad whereas a shrubbery may be of any shape.

Shrub borders and shrubberies should be planned and planted with the same care and on somewhat similar principles as those employed when planning and planting borders of herbaceous perennials, i.e. each plant should be given ample room to develop in a natural manner and each should be placed so that it can develop in full its particular qualities. If the shrubbery or shrub border consists of plants of many different kinds, these may be placed so that one enhances the display of another, perhaps by contrasting pleasantly with it in colour or form. Moreover, consideration should be given to such matters as relative height and flowering time. Care must be taken not to plant tall-growing kinds in front of those of a dwarfer habit. The border may be planned either for a concentrated colour display at one particular time, or for a successional display over a long period, for which care should be taken to see that shrubs with different flowering times are well assorted throughout the border. In order to do all these things successfully, it is quite a good scheme to draw a plan of the site to scale on a large sheet of paper and then cut out, also roughly to scale, disks of paper each representing the average mature diameter of each of the shrubs fancied. On these disks of paper the name of the shrub is written together with its colour, time of flowering and height. Now these disks can be arranged and rearranged on the plan until a suitable scheme is obtained. At first it will be rather like fitting the pieces of a jigsaw puzzle together, but it will be found that this method is quicker and more satisfac-

tory than trying to draw the plants directly on the plan. When the best arrangement has been obtained, the disks can be stuck in position and the whole used as a planting plan.

SICKLE A tool primarily used for reaping, and also employed in the garden for cutting rough grass, weeds, etc. There are various patterns each with some points of advantage, but for general garden purposes a type with a fairly heavy, curved blade attached with a crank to a short wooden handle, is most generally useful. It is used with sweeping movements, the blade being held close to the ground and parallel with it. When cutting rough grass or longer weeds, a hooked stick is useful held in the other hand and employed to lift grass or weeds that have been trampled or beaten down. It is essential that the blade should be kept really sharp and for this purpose a scythe stone should be used.

SIEVE Sieves are made in a great many sizes and with meshes which may be as fine as a piece of butter muslin, or be coarse enough to allow large stones to pass through. For ordinary garden purposes a sieve about 2 feet in diameter and with a $\frac{1}{2}$ -inch mesh will be found most useful, though it is desirable to have another smaller sieve with a mesh of $\frac{1}{4}$ -inch for the purpose of preparing fine compost for seed pans and boxes and for covering seeds. In the garden, sieves are used mainly in the preparation of soil for potting and seed sowing, and in both instances the soil should be rubbed through the sieve, not merely shaken in it, the reason being that only by rubbing can the fibre from the soil be passed through, and this fibre is valuable in seed or potting composts. When potting soils are being prepared for fairly large plants, it is best to dispense with the sieve altogether, and simply break up the lumps of soil by hand, leaving the biggest pieces about the size of a hen's egg. Beginners usually err on the side of sieving soil too much and too finely, with the result that composts are too close in texture and tend after a time to become badly aerated, water-logged and sour.

When large quantities of soil have to be sieved, it is a good plan to make a sieving bench, which should be done by fixing two pieces of wood about 15 inches apart, parallel with one another, on a framework which holds them about 2 feet from the ground. The sieve can then be placed on these 'parallel bars' and pushed backwards and forwards along them. The bars take all the weight of the soil, and the operator has only to provide the power to move the sieve backwards and forwards.

Very fine sieves, of the type used in kitchens and generally known as flour sieves, are sometimes employed in the garden for cleaning fine seeds, the idea being that dust harvested with the seeds will fall through the sieve but the seeds themselves will remain in it.

SILVER LEAF A disease which is found principally on plums, but which may also attack Portugal laurel, peaches, nectarines, apricots, almonds, cherries, apples and, less frequently, hawthorn, blackthorn and roses. It is caused by a fungus which penetrates the wood and eventually kills the branches



The lower plum leaves have been attacked by silver leaf



Silver leaf fungus on dead wood

or even the whole tree. An early symptom is a change in the colour of the leaves which become silvery green instead of green. It should be observed that this silverying is not due to any outgrowth on the leaves, as with mildew, but is an actual change in the colour of the leaf. After the wood is dead the fungus develops its spore-bearing bodies on the outside of the wood in the form of flattish, or bracket-shaped outgrowths that are purplish-mauve in colour. It is only at this stage that the disease can be passed on to other trees. By law it is an offence to allow wood that has been killed by silver leaf fungus to remain on the trees after July 15th. It is not necessary by law to remove branches which are alive but showing the characteristic silverying, but it is desirable to do so to prevent the disease from spreading to other parts of the tree. No remedy has been discovered for silver leaf but sometimes, if branches showing silverying are removed in good time, the disease is checked. All wounds made in pruning should be painted with thick white lead paint or warm grafting wax. It is wise not to prune plum trees in autumn or winter when the risk of infection with silver leaf is at its greatest, as infection may occur through pruning wounds.

SINGLE A term used by gardeners in contrast to double, and meaning a flower with the normal number of petals.

SINGLING A term synonymous with thinning. (See *Thinning*.)

SLASHER A type of sturdy, short-bladed billhook used for rough hedge trimming. It is a farm rather than a garden tool but may occasionally be required in large gardens where there are extensive hedges of hawthorn, beech, etc. Some slashers are made with short handles to be used in one hand only, and some with long handles so that the tool can be held with both hands.

SLEEPY DISEASE A name given to various forms of wilt disease. They are caused by fungi which attack plants at or near soil level, killing the tissues and eventually causing the whole plant to wilt and die. Tomatoes are particularly subject to such diseases, but cucumbers, melons, sweet peas and michaelmas daisies are also frequently attacked and potatoes may suffer. There is no remedy for these diseases once they occur and affected plants should be burned. If possible, soil should be changed before similar plants are grown again or alternatively the soil may be sterilized with formalin or by heat. Wilt diseases are most likely to occur when drainage is poor and the soil is deficient in plant food. Good drainage and cultivation will, therefore, help to prevent them from occurring.

SLIP A term synonymous with cutting, though it is generally used for that type termed a heel cutting. (See *Cutting*.)

SLUGS Many different species of slug may be found in the garden and not all are equally damaging. Slugs live on decaying vegetable matter as well as on living plants, and some species, particularly the very large slugs, appear to be more scavengers than pests. It is the small grey and black slugs that are most damaging. These eat leaves and stems and are quite capable of destroying small plants completely. The small black slug is particularly fond of fleshy roots, such as those of the potato, into

which it will bore. Slugs feed at night and hide by day. In consequence they are often not noticed and the damage they cause is erroneously put down to other pests. They are most likely to be active in mild, damp weather. Slugs can be destroyed by hand picking after dark with the aid of an electric torch and by trapping in small heaps of vegetable refuse placed on the soil and turned over each morning so that any slugs that have hidden beneath can be collected and destroyed, but the most effective method is to poison them with a suitable poison bait such as bran and metaldehyde. (See *Metaldehyde*.)

SLUGWORMS A general name applied to the caterpillar-like larvae of various species of sawfly. Slugworms have a slight resemblance to small slugs, but can be distinguished at once by the fact that they have legs. In colour they vary from yellow to black. They live on leaves and strip the surface from them, leaving the skeleton. This gives the leaves a very curious and distinctive appearance. Slugworms are most likely to be damaging to cherries, pears and roses, though other plants are attacked. The best remedy is to spray with nicotine, derris or DDT directly an attack is observed.



Slugworms on pear leaves

SMOKES For many years it has been the practice to apply certain fungicides and insecticides in the form of gas or vapour—a method usually referred to as fumigation

—but it is only in comparatively recent times that a technique has been evolved by which fungicides and insecticides can be carried by smoke which has not itself any insecticidal or fungicidal property. Smoke-producing bombs and canisters were developed to a very considerable extent during the 1939-45 war, and it was this work which suggested the possibility of using smoke to carry other chemicals. As a result of experiment, a number of smoke-producing containers have been manufactured, containing such popular insect-killing chemicals as DDT, azobenzene and gamma-BHC. These smoke generators are intended primarily for greenhouse use though some of them have been used experimentally in the open. The method of application is to place a canister (or canisters) of the required capacity in the house, ignite, and then leave the house at once and close all doors and ventilators until the smoke has cleared. What actually happens is that the smoke settles in a fine film on the plants in the house, and, for that matter, on anything else in the house, carrying the chemical which was combined with it, and so producing a protective covering, finer, yet more complete than could be obtained by most other means. Manufacturers invariably give instructions as to the capacity of their containers, these being stated in terms of the cubic capacity of the house which they are capable of treating. Smokes can be applied without any special preparation, but the best results are obtained if the paths and walls of the house, but not the plants themselves, are first damped down, and if the temperature is allowed to rise a few degrees above the normal.

SMUT A name used in gardens for a fungal disease of onions and leeks which attacks the leaves, causing them to develop a black mould as though they had been sprinkled with soot. No reliable remedy is known and all infected plants must be burned. It is an offence to grow onions or leeks on infected land without a special licence from the Ministry of Agriculture.

SNAILS The damage done by snails is very similar to that caused by slugs. Snails

are most likely to be troublesome in glass-houses and near buildings. They are particularly fond of sheltering by day on walls or stones, particularly if they can find shelter, as, for example, under ivy on a wall. Possible hiding places should be examined and snails collected. Snails can be killed with the same poison baits as slugs.

SOAP Soft soap is used as an insecticide, as a 'spreader' to secure a more continuous and even distribution of sprays over the surface of plants, and, with washing soda, as a fungicide. As an insecticide it is principally used against aphides and red spiders at the rate of 2 ounces per gallon of water but has been almost completely superseded by more efficient insecticides such as nicotine, HETP and azobenzene. As a spreader it is used at rates varying from $\frac{1}{2}$ to $1\frac{1}{2}$ ounces per gallon of wash according to the 'hardness' of the water. It must not be used with any wash containing arsenate of lead as it causes this to 'curdle'. As a fungicide it is principally used to control American and European gooseberry mildews, the recipe being 12 ounces washing soda and 8 ounces soft soap in 5 gallons of water. (See *Washing Soda*.)

SODIUM SELENATE A chemical which is occasionally used as a systemic insecticide. It is, however, very dangerous as it renders the whole plant poisonous to human beings and other warm-blooded animals. Moreover, it is retained in the soil and may be absorbed by following crops so as to render them poisonous also.

SOFT ROT A disease caused by a bacterium which attacks the roots or stems of celery, carrots, cabbages, seakale, onions and some ornamental plants including arum lilies and irises. As a result the centre of the plant or root becomes a wet, slimy mass of brown decay. The disease may occur in the ground, or, with carrots, while the roots are in store. The infection is likely to occur through wounds, so care should be taken to avoid damage to roots either by careless handling or by slugs, etc. Soft rot of irises, often known as rhizome rot, can be checked by cutting off and burning affected portions of rhizome and dusting

the soil around the plants with superphosphate of lime at 2 ounces per square yard. Where arum lilies are concerned, affected portions of roots should be cut off and the remainder of the root soaked for four hours in a 2 per cent solution of formalin.

SOIL Soils may be broadly classified in several different ways, e.g. as light, medium or heavy, according to the proportion of sand or clay that they contain, as alkaline neutral or acid, according to their pH, as coarse or fine according to their texture, light or dark according to their colour and mineral or organic according to the amount of humus contained. All these points are of importance to the gardener, and have some bearing both on the manner in which he will treat the soil in order to make it suitable for the cultivation of plants, and also on the kinds of plant which can be grown successfully in it.

For general garden purposes, the ideal soil will probably be a medium loam, fairly well supplied with humus, well drained, and with a pH of about 6.5. Soils which contain appreciable quantities of lime or chalk are almost always alkaline in reaction, and are consequently unsuitable for the cultivation of lime-hating plants such as heathers and rhododendrons. Soils with a very high percentage of humus are often acid in reaction and the same is true of many sandy heathland soils. When the pH reading is below 5.5 many cultural difficulties are experienced and numerous plants fail to thrive, but the acid-loving plants such as rhododendrons and heathers delight in such conditions.

The colour of soil may be influenced by the amount of humus which it contains, and by other factors, including the use of soot. Dark soils absorb more sun warmth than light soils, and consequently tend to encourage the early growth of plants. Bad drainage has a retarding effect on growth, and by contrast well-drained soils are frequently early. Contrary to popular belief, plants cannot live on humus and humus-rich soils are not always highly fertile though they can usually be rendered fertile by suitable treatment, which will include thorough cultivation and, usually,

heavy liming. The chief value of humus in the soil is the mechanical effect which it has on it, for humus is a sponge-like substance which absorbs moisture readily and yet maintains a fairly open texture which allows air to penetrate. Soils that are deficient in humus feel gritty to the touch and tend to dry out very rapidly in summer. If they also contain clay, they may set very hard after heavy rain, or if they have been walked on. Humus will tend to correct these faults.

Plants, in addition to requiring water in the soil and carbon dioxide and oxygen in the atmosphere, require as food a variety of chemical salts, all of which will be present in greater or lesser quantity in any fertile soil. It may well be, however, that the soil is deficient in one or more of these chemicals and that its fertility can, in consequence, be increased by adding suitable chemicals to it. This is the justification and the basis for all feeding with chemical fertilizers.

In addition to containing minerals and decaying organic material, all natural soil contains a vast population of microscopic organisms including fungi and bacteria. Some of these are harmful to plant life, some neutral and some beneficial. In a fertile and healthy soil the beneficial micro-organisms will be in excess of the harmful ones, but the balance can be upset either by infection of healthy soil with disease-causing organisms, or by bad physical conditions, particularly lack of aeration and waterlogging. Under such conditions the healthy organisms tend to be destroyed and the harmful ones to be encouraged. Beneficial micro-organisms are useful for numerous reasons, including the physical effect which they exert in making the soil more granular in texture and, therefore, better drained and aerated, and for their chemical effect in breaking down organic matter into simple inorganic chemicals in which form they are available as plant food. Some harmful micro-organisms attack plants directly, living in their tissues and bringing about decay, while others produce acids in the soil which are themselves harmful because they lower the pH of the soil and render it unsuitable for all but those plants

which like extremely acid conditions. Soils in the open can usually be kept in healthy condition by regular and intelligent cultivation, including digging, forking, and the application of bulky organic and concentrated inorganic manures.

It may sometimes happen that the soil becomes so heavily infected with some disease-causing micro-organism that remedial measures must be taken, but in general this is only likely to occur on a serious scale under glass, where plants are grown in a much more intensive manner than in the open and conditions tend to be altogether artificial. Under such circumstances it may well be necessary in time to sterilize the soil to get rid of these harmful organisms. It is not possible to sterilize in a selective manner, killing the harmful organisms and sparing those that are useful, but if the sterilization is carried out in one or other of the approved manners (see *Sterilization*) it will be found that, while the disease-causing organisms are destroyed, sufficient of the useful kind will remain to build up a thriving micro-population within a few weeks. This process will be encouraged if the soil contains an adequate amount of humus and of nitrogen.

Many cultural operations, including digging, forking and ploughing, are intended to improve the aeration of the soil and so encourage the multiplication of beneficial organisms, all of which require air for their existence. In contrast many harmful micro-organisms thrive in the absence of air, and it is for this reason that waterlogged or badly cultivated soils tends to become unhealthy.

Cultural operations such as digging and forking also tend to hasten liberation of plant foods locked up in the soil in chemical forms unsuitable for the use of plants. Cultivation of this kind is usually followed by increase of fertility, but reserves of food in even the most fertile soil are not inexhaustible and, in consequence, if the cultivation is continued year after year without any other treatment, there will come a time when the fertility of the soil will begin to decline. After that, the more it is cultivated the more quickly will it lose fertility. This inevitable process can only be pre-

vented by feeding soils which are under cultivation, and under this heading are included both manures of a bulky organic character and concentrated fertilizers.

Although plants require something like twenty different chemicals from the soil, only five or six of them are likely to be readily exhausted. The three most important are nitrogen, phosphorus and potash, and after this we may rank calcium (lime) and magnesium. Iron is seldom lacking in the soil, but may often be locked up because of unsuitable physical conditions such as a noticeably high degree of alkalinity. In such circumstances the addition of further iron is useless, as this will also become locked up. The correct course to adopt is to alter the condition which has caused the locking up of iron, e.g. where it is due to excessive alkalinity, to apply generous quantities of organic matter, which, as has already been stated, will tend to make the soil more acid.

Nitrogen, phosphorus, potash, magnesium and other useful chemicals are contained in bulky animal manures and in decaying vegetable refuse. They can also be applied in the form of chemical salts which are described under the headings, nitrogen, phosphorus, etc. Calcium is contained in many substances including wood ashes and organic matter. When lacking in the soil, it is usually applied in the form of lime, ground chalk or ground limestone.

A soil that is in natural condition and not cultivated tends to retain its chemical and physical balance as a result of the decay of vegetation and the death and decay of small creatures, including insects, in the soil, and also by droppings of animals. When cultivated, the balance of these natural processes is completely altered and fertility is consequently impaired unless manuring is practised, as already outlined.

Bad drainage, in addition to resulting in bad aeration and the consequent increase in the population of undesirable micro-organisms, also tends to chill soils and make them late. It is often possible to hasten the growth of plants considerably by improving the drainage of a heavy wet soil.

SOIL BLOCKS Compressed blocks of soil which are used instead of pots for raising seedlings and growing on young plants. Numerous ingenious devices have been invented for making these blocks from ordinary potting soil, which should be slightly more moist than for normal potting. It is claimed for soil blocks that they save expense, and that plants when transplanted to their final quarters do not suffer any check to growth.

SOIL CONDITIONER A name given to certain substances which improve the texture of heavy soils without directly contributing either to their humus or plant food content. One of the most publicized of these substances is a synthetic resin which has been marketed under the trade name 'Krilium'. This is a fine white powder which in solution in water becomes ionized, each ion carrying negative electrical charges. The effect of this in the soil is apparently to attract positively charged colloidal clay particles binding these together into larger granules. Improvement in soil texture is seen within 24 hours of application and is very lasting as Krilium is held in the soil and is extremely stable. Rate of application is from $\frac{1}{2}$ to 1 lb. of Krilium to 100 square feet of soil surface and it may either be watered or raked in.

A range of chemicals derived from seaweeds and known as alginates have also been used as soil conditioners. They include sodium alginate, calcium alginate, ammonium alginate and alginic acid but of these the first has been found most satisfactory. Alginates are colloidal in character and their effect seems to be very similar to that of Krilium, namely they bind together the very fine particles found in heavy soils. Unfortunately, though laboratory experiments with sodium alginate have been very successful, field trials have given mixed results; in some better soil texture and improved crops have been produced and in others crop depression has been caused.

SOILLESS CULTIVATION Any method of growing plants without soil. Probably the earliest example of soilless cultivation was in the mid-nineteenth century when

scientists began to investigate the way in which plants feed and the kind of foods they require. At this time soilless cultivation was entirely a laboratory process and it does not appear to have occurred to anyone that it had any wider value until about 1930. It was then discovered that certain plants grew extremely well under certain forms of soilless cultivation, particularly when cultivated under glass or where there was a great deal of sunshine. Plants can be fed more intensively than is possible when they are grown in soil and as a result more plants can be grown in the same area and heavier crops can be obtained from them. This method of cultivation has proved particularly suitable for perpetual flowering carnations and for tomatoes, and has been highly developed on a commercial scale for both plants. It is also useful for many others, including some that are difficult under ordinary soil conditions, e.g. gerberas.

At first the method known as hydroponics was employed. In this the plants are supported on wire mesh, wood wool or glass wool, over a tank containing the nutrient solution into which their roots hang. This method has been almost entirely superseded by what is known as aggregate culture. In this the bed, tank, pot or box in which the plants are to grow is filled with some non-nutritive substance such as sand, gravel, washed breeze or vermiculite, which serves simply as a rooting medium. This aggregate is then flooded with nutrient solution.

Many different systems of feeding the plants have been tried with success. The simplest is to prepare the plant foods as a dry mixture of fertilizers, a measured quantity of which is sprinkled over the surface of the bed at stated intervals. Plain water is then used to wash these nutrients into the aggregate. A more popular and generally satisfactory method is to prepare a nutrient solution and apply this to the sand in place of plain water.

A more complicated system of liquid feeding which is used in many commercial installations is that known as the sub-irrigation system. In this the aggregate is placed in a specially constructed tank or

bed completely lined with concrete or some other impervious substance, but with suitable outlets for surplus moisture at the lowest points. Nutrient solution is prepared by dissolving the necessary chemicals in a large tank of water sunk below the level of the bed containing the aggregate. It is pumped up from this tank into the aggregate by means of an electric pump. When the aggregate is completely flooded with nutrient solution the pump is automatically cut off and the surplus solution slowly drains back into the storage tank. The pump is either switched on again by the gardener in charge or it may be switched on automatically by a time switch set to flood the bed at predetermined intervals. This system has the merit of reducing labour to a minimum but it suffers from the drawback that the strength of the solution gradually weakens and, even more serious, may change in the proportion of the nutrient elements one to another. In consequence frequent analysis of the contents of the storage tank must be carried out, and this is work for a skilled chemist. Regular feeding with a nutrient solution applied from a watering can seems to be the most practical method for the amateur.

The details of feeding and the frequency with which the feed is given will vary according to the type of plant being grown, the time of year and the amount of sunshine. Similarly the nutrient solution employed will vary according to the kind of plant being cultivated. Proprietary feeds specially blended for certain classes of plant can be purchased, and these should be used strictly in accordance with manufacturers' instructions. A good general solution for liquid feeding which will be found to give satisfactory results with the ordinary run of flowering plants, may be prepared as follows: nitrate of soda 14 ounces, sulphate of potash 2 ounces, superphosphate of lime $7\frac{1}{4}$ ounces, sulphate of magnesium (Epsom salts) $4\frac{1}{2}$ ounces, water 50 gallons. A separate solution should be prepared by dissolving boric acid $\frac{1}{4}$ ounce, sulphate of manganese $\frac{1}{4}$ ounce, sulphate of iron 3 ounces, in 1 pint of water. Just before the main solution is used this subsidiary solu-



Soilless culture beds

tion should be added to it, at the rate of 1 teaspoonful to 10 gallons.

When this kind of overhead feeding is adopted the aggregate should be of a kind that will not dry out too rapidly. Clean, strong sand with medium-sized particles is ideal. It can be used in any kind of container with an outlet for surplus water, such as a flower pot, box, or bed lined round with boards or bricks. For sub-irrigation cultivation a much coarser aggregate must be used, such as gravel or broken clinker, and the bed itself must be made of some impervious material.

SOOT Ordinary domestic soot contains nitrogen in the form of sulphate of ammonia. It is, in consequence, a fertilizer. In addition, however, to its value as a plant food, it is also of use because it darkens the soil and therefore enables it to absorb more heat from the sun. Because of this dark soil tends to be warmer than light soil and can be used to produce earlier crops. Fresh soot may contain quite a high percentage of sulphur and other chemicals, which, in excess, can be harmful to plants. It is, in consequence, best to store it for three or four months before use. It can either be applied as a surface dressing round the plants in growth, or be hoed, raked, pricked or dug into vacant ground. The average rate of application is 6 ounces per square yard. This is only a rough guide as soot itself varies considerably in its nature, some samples containing far more

nitrogen than others. If soot is exposed to rain, it quickly loses much of its value as a fertilizer as the sulphate of ammonia in it is soluble and easily washed out. Fresh soot has some insecticidal value and is occasionally used on vacant ground to kill or drive out wireworms, leather jackets, cockchafer larvae, etc. Its value for this purpose is, however, not very great and it should be replaced by recognised soil insecticides such as gamma-BHC and DDT.

SOOTY MOULD Sometimes leaves or stems of plants become covered with a black mould which can be removed quite easily if rubbed with a damp finger or cloth, leaving the leaf clean and unharmed. This is known as sooty mould, and the mould is, as a rule, growing on the deposits left on the leaves by various insects, particularly scale insects and aphides. Though the mould does not attack the leaf itself, it is detrimental as it blocks up the breathing pores of the leaf. It is also very unsightly. It can be removed by sponging with warm soapy water and steps should be taken to keep down insects by spraying with nicotine, HETP or some other suitable insecticide.

SOUR This term is often applied to soils which are in an unhealthy biological condition, i.e. with a preponderance of undesirable micro-organisms (see *Soil*). Such a condition is often due to waterlogging or to poor aeration caused by lack of cultivation and bad soil texture. Sour soils usually have a slightly unpleasant smell. All plants do badly in them and may even refuse to grow at all. The term should not be confused with acid, which refers to a physical not a biological condition of the soil. It is true that a soil which is sour is likely to become acid if the adverse conditions are allowed to continue, but it by no means follows that every sour soil is acid, and it is certainly not true that every acid soil is sour, using these terms in the sense in which they are employed in gardens. Moderate acidity is not in itself harmful and may even be beneficial to some plants, notably members of the heather family,

whereas sourness is always bad and should be corrected as soon as noted. The remedy is to improve drainage, if this is at fault, and also to improve the texture of the soil, which may be done by thorough digging or forking and the incorporation of bulky organic substances such as compost and strawy manure. Where heavy clay soils are concerned, liming may also help by flocculating the clay and so improving the drainage. (See *Lime*.)

SOWING, see *Seed Sowing*.

SPADE The most important of the digging tools used in the garden, which will be required not only for ordinary digging, but also for trenching and the planting of many large plants, including trees and shrubs. Spades do not vary greatly in pattern, though in Devonshire the old long-handled spade is still sometimes employed. For all ordinary purposes, however, the standard pattern of short-handled spade with a slightly cranked shaft and a D-shaped handle is recommended. This is usually made in three sizes known respectively as No. 1, No. 2 and No. 3 which differ only in the size of the blade, No. 1 being the smallest and No. 3 the largest. For all ordinary garden purposes a No. 2 spade will be found satisfactory, and in many instances the No. 1 spade will be found more convenient by the amateur who is inexperienced in doing heavy work. It is also possible to buy small spades, usually known as border spades, which are useful for ladies and also for some kinds of planting. These border spades usually have a blade $5\frac{1}{2}$ to 6 inches in width and 9 to $9\frac{1}{2}$ inches in length and are considerably lighter than the No. 1 digging spade. Some spades have a tread on the top edge of the blade to lighten the wear on the boot, when this is used for pressing the spade into the soil. This type of spade is often known as 'London-treaded' and is to be preferred to the plain-topped blade. There is also some difference in the method of attaching the blade to the shaft. The usual garden type has a strapped socket with three rivets. For some very heavy work, such as lifting of well-rooted plants in the nursery, spades with longer



*A digging
spade*

straps and 4 or 5 rivets are employed, but they are heavy and should not be used unless the work really necessitates the increased strength. The alternative to the strapped socket is the tubular socket, but this is not recommended as it is much more likely to cause breakage at the point where the wooden handle enters the socket.

In addition to digging spades, there are special narrow, but longer-bladed spades made for digging trenches for draining, etc. Those with rectangular blades are often known as grafting tools whereas those with slightly tapered blades are known as draining tools.

SPADIX A particular type of flower spike in which the stem is thick or fleshy. As a rule it is surrounded by a spathe as in the arum lily (*Zantedeschia*).

SPATHE A special type of inflorescence, found in aroids and palms and well exemplified by the arum lily, in which one leaf or bract is folded around a central spadix consisting of a column-like spike of flowers.

SPAWN The term is used in several ways in gardening, but always to indicate some means by which a plant increases itself. Thus the spawn of a mushroom is the mycelium or thread-like growth of the mushroom, produced in a suitable medium such as a sterilized culture in a bottle, or in a brick of suitable compost, which is then broken up into small pieces and placed in a mushroom bed where it proceeds to grow.

The small cormlets or tiny corms which form round the outside of gladiolus corms are also often known as spawn, and the name may be applied to other cormlets and bulbs forming around bulbous-rooted plants.

SPECIES, see *Classification*.

SPECIMEN PLANT Any plant which is grown so that it can be viewed from all sides as distinct from being grouped with other plants.

SPHAGNUM A genus of mosses which are usually found in damp or even boggy places. They make very dense growth which, because of its power to absorb moisture like a sponge, makes an excellent packing material for plants or for the stems of cut flowers. It is also extensively used in orchid potting compost, for which purpose it is chopped up finely. A wad of sphagnum moss is sometimes placed in the bottom of earthenware pots and pans in which seeds are to be germinated or cuttings struck, the idea being that it produces good drainage and yet holds sufficient moisture to keep the compost moist. Sphagnum moss is almost invariably used by florists as a basis for wreaths. Decomposing sphagnum forms a particular kind of peat, usually known as sphagnum peat or moss peat. It is a particularly suitable kind of peat for use in the garden, especially in seed and potting composts. Good sphagnum peat should be fibrous or granular in texture and should not contain a great deal of fine dust which would clog up the compost and impede drainage.

SPIKE A flower cluster very closely resembling a raceme (*q.v.*) but differing from it in having individual flowers which are

stalkless or nearly so. The term is often loosely used by gardeners for any elongated flower cluster. For example the flowers of delphiniums are often described as spikes though in fact many of them are racemes.

SPIT One spade's depth of soil. Obviously as spades vary in size so will spits vary in depth, but the convention is to regard a spit as between 10 and 12 inches. Thus if a statement is made that ground is to be dug two spits deep, the intention is that it should be dug to a depth of 20 to 24 inches. Top-spit soil is the first 10 or 12 inches beneath the surface; second-spit the next 10 or 12 inches; third-spit soil the 10 or 12 inches below that, and so on.



A spit

SPORE The fine dust-like cells by which ferns and mosses distribute themselves. They may be compared with the seeds of flowering plants but the analogy, useful as it is in some respects, must not be carried too far as the spores are not themselves the product of union of the sex cells of the organisms but give rise to a prothallus which produces the sex cells. In consequence if two ferns or mosses are to be hybridized together, all that the gardener can do is to take spores from both species or varieties, sow them together, and then hope that, when they produce their respective prothalli, nature will do the rest and cause hybridization between them.

The term is also used for the reproductive cells of fungi which are also dust-like and produced in immense numbers but are otherwise entirely distinct in structure and function from those of ferns and mosses. The spores of fungi are produced from the fruiting pod, which may be a large object like a toadstool or mushroom, or quite a tiny object such as the conidia of a rust fungus on the back of hollyhock or rose leaf.

Spores of all kinds are freely distributed by wind because of their minute size and can be carried great distances by this means.

SPORT Strictly speaking any variation from the normal in the character of a plant may be termed a sport, but in garden practice the term is usually reserved for variations which occur apart from seed. For example, it will sometimes happen that some of the flowers on a chrysanthemum plant will be of a different colour from the other flowers on the same plant and this variation is termed a sport. The genetical term for such a variation is a mutation.

Sports occur spontaneously in many plants and some kinds of plants are particularly liable to produce sports. They are common, for example, in chrysanthemums and also in some varieties of polyantha roses, particularly those with orange flowers which frequently sport to red. It must be clearly understood that sporting is by no means confined to a change in colour, but may affect any characteristic of the plant. In roses, bush varieties sometimes sport as vigorous climbing forms, and many of our best climbing roses have been obtained this way.

Sporting is due to a change in the character of one or more genes carried in the chromosomes. If such a change occurs in the apical cell of a bud or growing shoot, the growth produced by that bud or shoot will be of a new type, though the remainder of the plant will remain unchanged. Such sports can only be perpetuated from material obtained from the sporting shoot or shoots. In the case of chrysanthemums, for example, if one shoot of a plant produces blooms of a different colour and it is desired to perpetuate this colour, cuttings

must be obtained from this particular shoot and not from other shoots or from the base of the plant. This may necessitate using material which would normally be considered unsuitable for the purpose of making cuttings, but once plants of the new variety have been established, normal cutting material can be obtained.

SPRAIN Sometimes potato tubers are discovered to have dark streaks in the flesh. This is known as sprain and is a physiological disorder, usually connected with rapid fluctuations in the water content of the soil. Improved drainage and good cultivation generally will prevent sprain from occurring.

SPRAYING Many chemicals used to destroy insects or fungi are most conveniently applied to plants in the form of a liquid spray. Many different types of apparatus have been produced for the purpose of applying such sprays, and these range from simple hand syringes, consisting of a plunger working inside a tube fitted with a fine nozzle, to complicated mechanically driven apparatus, capable of spraying liquid in a fine mist at considerable pressure over a large area. For many years the practice was to employ very dilute solutions and to distribute a comparatively heavy spray over the plants. More recently experimental work has been carried out with much more concentrated solutions in which far less liquid is atomized very finely, and distributed in the finest possible film over the plants. A development of this system is that known as the aerosol, produced by a cartridge of carbon dioxide under pressure, discharged into a small container filled with a spray fluid. The carbon dioxide not only blows the fluid at great pressure through a very fine hole, but also dissolves in the liquid and then discharges from it with the 'boiling' action familiar in soda water. In consequence the liquid is broken up into a cloud-like mist of great penetrative power. Though aerosols have been used outdoors, they are on the whole more suitable for greenhouse use and for this purpose may be compared in efficiency and convenience with insecti-

cidal and fungicidal-carrying smokes. (See *Smokes*.)

Normal spraying in the open garden is usually done with some form of syringe or hand-operated pump, though in larger gardens small, mechanically-driven spray plants are employed, some operating from petrol and some from electric motors. The essential with all good spraying apparatus is that the liquid must be broken up into a fairly fine spray. Too coarse a spray may cause damage to the plants, as some insecticides and fungicides will scorch tender leaves, flowers and fruits, if applied too heavily. A second point of importance is that the spray must be produced with some force, so that it penetrates between the branches or leaves of the plant and covers all with equal efficacy. Weak spraying apparatus will result in partial coverage of the outer leaves, and pests and diseases will continue to thrive undisturbed in more out-of-the-way places. For the same reason it is important to wet the undersides of the leaves of the plants as well as the upper surfaces. To enable this to be done conveniently it is often an advantage to have the spray nozzle cranked at an angle to the lance or barrel of the spraying apparatus. Spraying apparatus which is to be used for fruit trees, must be equipped with lances sufficiently long to enable the uppermost branches of the tree to be reached, or failing this the gardener must work from a ladder or steps.

Some spray fluids will corrode iron and certain other metals. For this reason most good spraying apparatus is made with working parts of brass which has a high resistance to most of the fluids in common use. Even so it is highly desirable that all spraying apparatus should be thoroughly washed out with clear water after use.

It has been shown conclusively that some emulsified sprays, particularly those applied in winter to kill eggs of caterpillars and aphides (e.g. tar oil wash, petroleum oils and DNC) are more effective if applied at fairly high pressures, at least 200 pounds per square inch. This appears to be due to the fact that such sprays are apt to remain in emulsion and so out of direct contact with the insects or eggs they are meant to

destroy, unless they hit them with some force. Unfortunately it is seldom possible to obtain pressures of anything like this order with hand-operated machines, though one or two ingenious devices have been produced for the purpose.

Wherever possible spraying should be done in dry, still weather. Most of the insecticides and fungicides in common use adhere firmly to the plants when dry, but if rain falls while they are being put on or within an hour or so of their application, they may be washed off or diluted to such an extent as to be ineffective. Spraying in windy weather is always a trying and wasteful operation. Unfortunately both these instructions are counsels of perfection which must often be ignored, as frequently the time margin for spraying is small, and it must be carried through almost irrespective of the weather. As an example, the use of lime sulphur to control scab of apples may be mentioned. One application should be given at the pink bud stage, and this stage normally lasts for only five or six days.

Sprays may be broadly considered under two headings, those which are preventive and those which are directly destructive. Examples of the former are most fungicides such as sulphur and copper compounds and also poisons directed against biting insects such as caterpillars, e.g. arsenate of lead and derris. The intention with all these is to coat the entire plant with the finest possible film of the fungicide or insecticide before attack occurs, so that directly the spores of a fungus alight on leaf or stem and commence to grow, they will be killed, or directly an insect bites stem or leaf it will at the same time obtain a fatal dose of poison. By contrast the directly destructive sprays are used mainly against sucking insects such as aphides, red spiders and thrips. Because of their mode of feeding by inserting a thin proboscis like a needle into the cells of the plant and sucking the sap directly from them, these will escape the poisons spread on the surface of the plant. They must be attacked by being themselves coated with poison, and this is done by spraying directly the attack commences. When applying preventive sprays a fine covering is sufficient, and a

fine, mist-producing nozzle can be used on the spraying apparatus, but for the directly destructive or contact sprays a coarser nozzle and heavier, more wetting spray is to be preferred.

It is seldom wise to spray with insecticides while plants are in bloom, as at this time they are usually visited by many beneficial insects including honey bees, and the sprays which kill harmful insects are often fatal to useful insects as well. A further warning is that many of the sprays used against insects are also poisonous to warm-blooded animals including human beings, and must be handled with due care. Amongst the more poisonous substances in common use are nicotine, arsenate of lead, HETP and TEPP. With all these the fatal dose of the concentrated chemical to a human being is extremely small, though as a rule the diluted chemical applied to a plant is unlikely to do any harm unless used with gross carelessness.

SPREADER Any substance added to another for the sole purpose of enabling it to be distributed more evenly. Thus chemicals that are to be used as dusts to destroy pests or diseases, are usually mixed with an inactive substance which will give them bulk and enable them to be spread evenly over the plants to be protected. Similarly many concentrated fertilizers are mixed with sand or rape dust so that they can be properly distributed over the soil. Spreaders are also used in liquid sprays, not to add bulk but to lower surface tension so that the liquid spreads as a thin film instead of forming droplets. Ordinary soap may be used in this way but usually more concentrated substances, such as saponin, are employed.

SPRINGTAILS Very small white arthropods which are sometimes found in great numbers on the roots of various plants. The popular name refers to the habit of these insects of jumping when disturbed, by coiling and then rapidly uncoiling their bodies. Springtails feed on decayed vegetable matter and follow in the wake of other troubles, but it seems probable that, having started to feed on an unhealthy root, they

may cause the decay to spread still further. Good cultivation and improved drainage will usually tend to reduce the number of springtails. Care should be taken to avoid an excess of half-rotted vegetable matter in the soil. Gamma-BHC pricked in at 2 ounces per square yard will kill springtails.

SPRINKLER A name given to various types of apparatus for overhead irrigation. The most familiar type of sprinkler is the revolving water spray used for watering lawns. Of this there are various patterns. Quite a different type of apparatus is the oscillating pipe-sprinkler in which jets are placed at intervals along a length of iron pipe, which itself rotates backwards and forwards through an angle of about 90 degrees, the power for this movement being provided by the water passing through a turbine on its way into the pipe. (See *Irrigation*.)

SPROUT Any young shoot and particularly the first shoot of a germinating seed. The young growths of potatoes are referred to as sprouts, and it is a common garden practice to place potato planting-sets in boxes, in a light and cool but frost-proof place so that they may form sturdy sprouts before they are planted in spring. This has two advantages; the sprouting potatoes are in a condition to grow very rapidly when soil conditions make it possible to plant, and the number of shoots produced per tuber can be artificially limited by rubbing out superfluous sprouts. This restriction of shoots is considered to be an advantage when potatoes are grown for exhibition, as with a small number of shoots, large tubers are more likely to be produced.

SPUD A very narrow-bladed hoe with either a long or short handle, used for cutting out weeds without too much disturbance of the surrounding ground. Some spuds are made with a hook-like projection on one side of the blade with which the weed can be drawn out after it has been cut off.

SPUR This word is used in two quite distinct ways in the garden. Botanically a

spur is a tube-like appendage to a flower in which nectar is produced to attract insects. A familiar example is the long, gracefully formed spur of aquilegia (columbine). The word is also used by fruit growers to describe the rather complex clusters of fruit buds which occur on the older branches of certain kinds of fruit tree, notably apples and pears. Such spurs tend to branch and multiply in a remarkable way so that, on an old tree, spurs of considerable size may occur, each carrying a large number of fruit buds. These big spurs are seldom satisfactory, as the fruit they carry tends to be over-crowded and small. The remedy is to reduce the size and number of spurs from time to time by drastic autumn or winter pruning, which may include the complete removal of some spurs and the reduction in size of others.

SQUILL Really the popular name of the scilla, but to most gardeners it is more familiar as the name of a rat and mouse poison sold as red squill. This is obtained from a near relation of the scilla named *Urginea maritima*. It can be obtained as a powder or liquid, to be mixed with some suitable bait. Red squill is a violent emetic, and is consequently lethal to rats and mice, which cannot vomit. It is not likely to do much harm to dogs and cats, which can vomit with the greatest ease on the slightest provocation, but it should not be assumed that it can be eaten with impunity by human beings, particularly children.

STAGE The tabling or shelving in a greenhouse on which the plants are arranged. Staging can be of many different kinds, ranging from open slat staging which is most suitable for those plants requiring a rather dry, airy atmosphere, to solid staging covered with gravel, peat or sifted cinders, which is most suitable for those plants requiring a warm and moist atmosphere. Staging can be permanent or portable according to requirements. The term stage is also applied to the tables at flower shows and an exhibitor is said to stage his exhibit when he arranges it.

STAKING Many plants are sufficiently sturdy to support themselves without any

artificial aid, but some require staking, and this is particularly true of highly developed garden forms that have very large flowers, for example the giant delphiniums and dahlias. Staking is also often necessary with young plants, particularly young trees and shrubs, until their roots have become sufficiently established in the soil to hold them firmly.

There are three points to be considered in all staking. First the stake or stakes must be sufficiently strong for their purpose. Secondly they must be of such a type and size as not to damage the plant that they are meant to support, and thirdly they must be as sightly and inconspicuous as possible.

Comparatively small or slender plants can be supported with bamboo canes, and, provided the canes are fairly stout, they will even be adequate for such things as delphiniums. When it comes to really heavy flowers, such as those of the giant decorative dahlias, bamboo canes are insufficiently sturdy. Instead 1 inch by 1 inch deal stakes may be used, or any other supports of comparable strength. For trees, 2-inch square stakes are the minimum that should be considered, or alternatively sturdy larch poles may be employed.

As regards the second point, damage is most likely to occur if stakes are made of rough material, or are too long. For example, the stakes used for delphiniums should reach to the base of the flower spike but not beyond or it will be almost inevitable that, as the spikes sway in the wind, the lower flowers will be damaged by the stake. Similarly dahlia stakes should extend part of the way up the flower stems but not to the flowers themselves. Provided stakes are firmly fixed in the soil so that they cannot work themselves loose, it is not altogether a disadvantage if they are a little flexible. Steel stakes are excellent for delphiniums for this very reason, because they allow the long stems to give a little in a high wind, and this often results in less damage than would occur with a perfectly rigid support.

On the score of sightliness also it is important that stakes should not be too long. The ideal is that they should be com-

pletely covered by the growth of the plant. If this is to be achieved, they must be a little shorter than the eventual height of the plant, and should be inserted in the soil near to the plant's centre. With some plants it is an advantage to have three or more stakes pushed into the soil close to the plant but leaning a little outwards towards the top so that, when shoots are tied to the stakes, they are opened up a little in the form of a shuttlecock. This is very useful for tall plants with a lot of foliage such as delphiniums and michaelmas daisies.

Many plants of weak or branching habit may be supported neatly by means of bushy branches such as hazel. If one or two of these branches are thrust into the soil close to the plant quite early in the spring, the plant will grow up through the twigs, finding its own support in the process and at the same time completely hiding the twigs from view. This is very similar to the method of support commonly used in the vegetable garden for culinary peas, for which hazel branches are inserted on either side of the row to form a continuous support up which the plants can scramble.

Tomatoes need very strong stakes since, though the plants themselves are comparatively light, when laden with a crop of fruit the weight carried by the stake may be considerable.

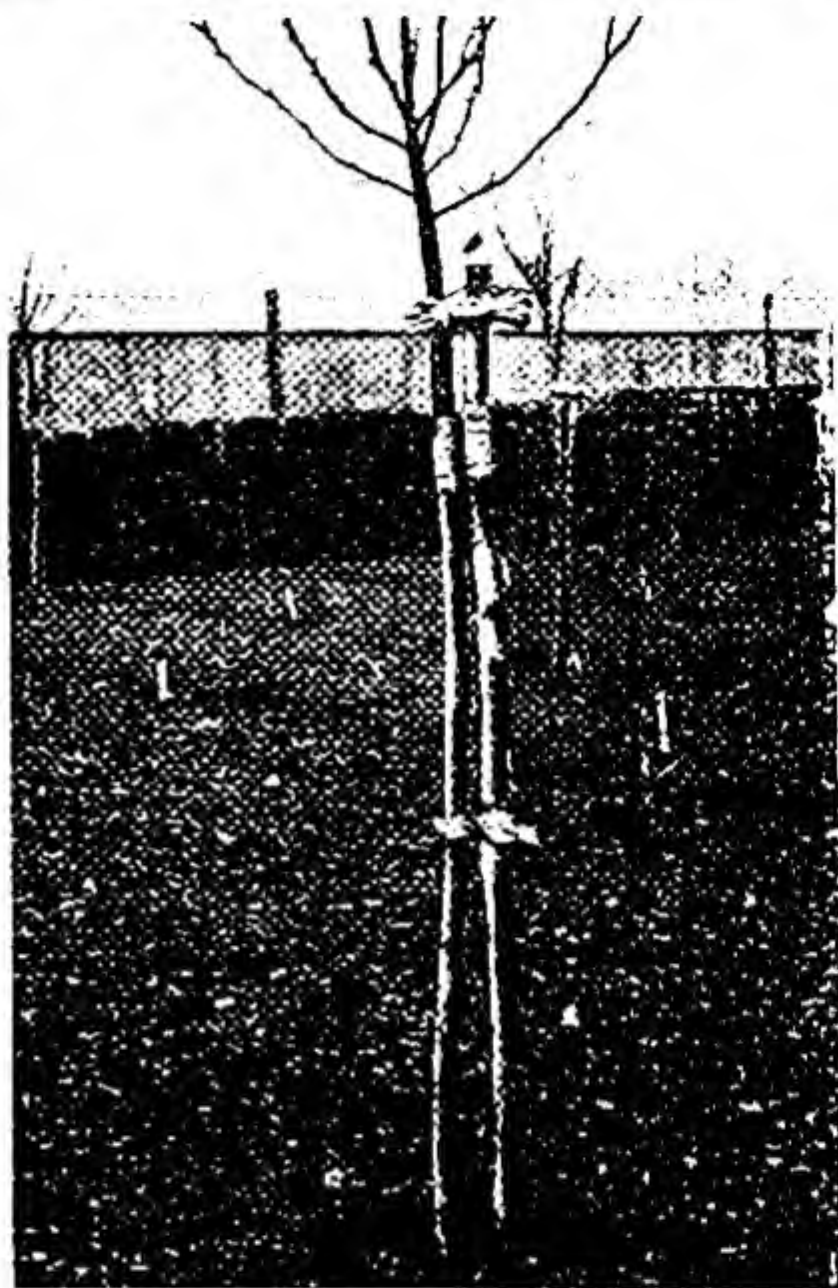
Runner beans, though not particularly heavy, present an enormous area to the wind and for this reason require particularly secure staking. The usual method is to employ long hazel rods or bamboo canes thrust firmly into the soil in a double row, spaced about 2 feet apart at the base and crossing near the top. Horizontal canes or rods are laid in the forks formed by the crossing uprights and are lashed to these with twine. This type of support is extremely strong and will stand up to quite high gales. An alternative method is to push the canes or rods in vertically and secure them at the top to horizontal wires strained between strong posts driven well into the soil and further strengthened by being joined by crossbars nailed to them. This kind of staking is often employed for sweet peas trained on the cordon system, one cane being placed for each plant.

In private gardens young fruit trees are usually supported with one strong stake driven in vertically close to the main trunk of the tree, but in commercial orchards a shorter stake driven in at an angle is more commonly employed. This method has the advantage of strength but is not as neat as the vertical stake and it does make it a little more difficult to cultivate the soil round the tree. The stake should be driven in on the side of the tree away from the prevailing wind (that is, usually on the north-east side of the tree in Great Britain), and should cross the main trunk $2\frac{1}{2}$ to 3 feet above soil level. The trunks of fruit trees should always be protected against chafing by the ties. Common practice is to wrap a piece of sacking round the trunk where the tie comes; alternatively a piece of old motor tyre inner tube may be used. Special rubber ties, which have the merit of being neat, strong and safe are available for fruit trees.

When tying plants with string or raffia it is usually wise to make a double twist in the tie between the plant and the stake. This twist acts as a spring, allowing a certain amount of movement in windy weather and also a certain amount of room for further expansion of the shoot or branch.

Climbing and twining plants will need supports according to their habit of growth and the place in which they are planted. It is sometimes possible to use old tree trunks for the purpose or even to plant climbers such as clematis against living trees, which suffer no harm from their slender growth. When poles have to be provided, they should be made of some wood which will not rot easily, such as oak, teak or larch, but even then that part of the support which is to be put into the soil should first be treated with some preservative material such as copper naphthenate.

Plants growing against walls may be supported on wooden trellis-work. It is fastened to the wall with screws and rawlplugs or by similar means, or wires may be strained against the wall, in which case the metal supports known as vine eyes will be found convenient to carry the wires a few inches away from the wall. It is seldom wise to fasten direct to a wall with nails and string



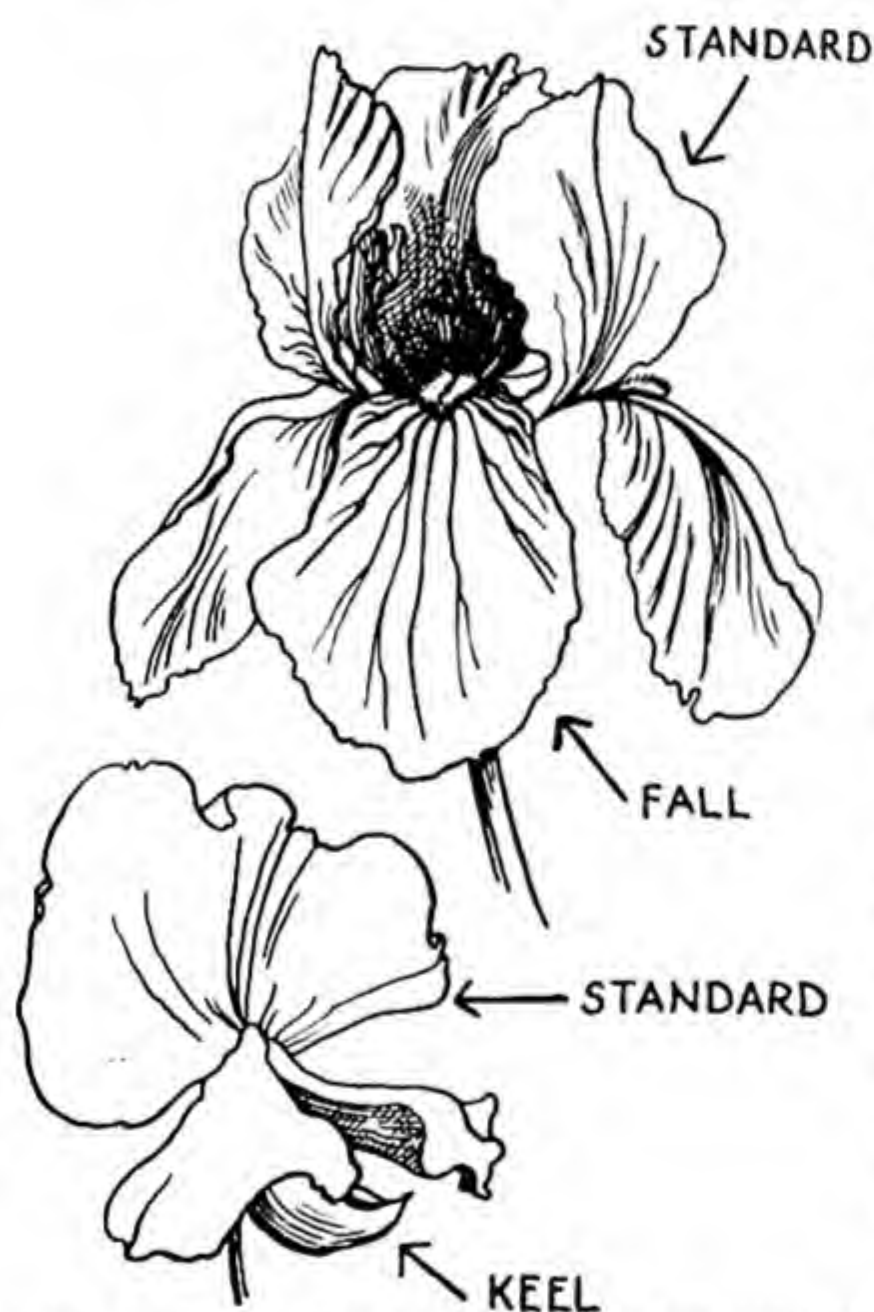
Staking and tying a fruit tree

or by any other means, partly because a wall surface is likely to get too hot at times and partly because the wall is bound to become damaged by the frequent necessity of driving in fresh supports.

STAMEN The stamen is the male organ of the flower and it usually consists of two parts—a thin stalk or filament, and a head or anther. It is the latter which produces pollen with which egg cells produced in the ovary of the flower are fertilized. When hybridization is carried out ripe pollen is transferred from the male to the female parent, and where possible it is wise to remove all stamens from the flower which is to carry seed, so that there may be no chance of accidental self-pollination. This removal of stamens should be done quite early in the development of the flower before the anthers have become ripe and commence to shed their pollen. It may be necessary to remove the petals of the expanding flower to get at the stamens so that

they can be cut off with a small pair of pointed scissors.

Sometimes stamens become changed into petals and it is in this way that semi-double and double flowers are produced. In the former instance only some of the stamens have been converted into petals, but in fully double flowers all have been changed. Sometimes the stamen changes into a complete and fully-developed petal, in other instances the petal is small and of a different character from the normal petal. It is in this latter manner that the petaloid flowers seen in some forms of peony and also in certain camellias are produced.



The standard and fall of an iris and the standard and keel of a sweet pea

STANDARD A term with both a botanical and a horticultural application. Botanically a standard is the upper petal of a flower of the pea family, but gardeners also apply the term to the broad upright petals found in some irises including the so-called bearded irises. In pea flowers the 'standards' are in contrast to the 'keels'; in irises

the 'standards' are in contrast to the 'falls'.

Horticulturally the term 'standard' is applied to any tree or shrub grown on a bare stem several feet in height. Most trees automatically assume a standard habit as they age, because the lower branches fall off leaving a bare trunk of varying height. Fruit trees are often trained by the gardener as standards from an early stage by removing all side growths and running up one central stem to a height of about 6 or 7 feet after which the top of the stem is removed in order to force it to produce a head of branches at this height above ground level. Standard roses are usually produced by allowing a briar stem to run to a height of 5 or 6 feet and then inserting buds of the garden variety at this level, putting them either into the base of side shoots in stems of *Rosa canina* or direct into the main stem when using *R. rugosa*.

Sometimes quite small shrubs are trained as standards. At one time it was fashionable to grow fuchsias in this way, both as specimens in the greenhouse and for summer bedding schemes. A strong main stem is first allowed to develop, and the plant is then beheaded at the required height in the manner already described for fruit trees. In the fuchsia the stems are rarely more than 3 feet in height.

Half-standard is a term applied to trees and bushes on a bare main stem considerably less than the length usual in standards. The precise height of the stem will, however, vary according to the nature of the plant under consideration. For example, half-standard roses are usually on stems 3 feet in height, full standards being on 5-foot stems. Half-standard fruit trees are generally on stems 3 to 4 feet in height, in contrast to the 6 feet of full standards.

STARTING This term is used in the garden for the process of bringing certain plants into growth after the dormant period. For example begonia tubers, which are allowed to become dormant in the autumn and are kept quite dry until January or February, are later placed in damp peat, leaf mould or some similar material in a warm greenhouse solely with the intention of starting them into growth.

There will be little nourishment in the peat or leaf mould to keep them growing, so that, as soon as shoots appear, they are transferred to a normal compost in which soil is included. A somewhat different application of the word is applied to greenhouse vines which are maintained in a dormant condition in winter by giving the fullest possible ventilation and withholding all artificial heat, and are then started into growth, at the time chosen by the gardener, by the simple process of closing the ventilators and applying artificial heat to the vinery.

STEEPING Some seeds with hard coats germinate very slowly or irregularly unless steeped or soaked in water for a period before they are sown. The system is also often applied to the cormlets or tiny corms produced by gladioli, as these have extremely hard coats through which growth has difficulty in forcing its way. If, however, the cormlets are soaked in water for 24 hours before being planted, the hard coats are softened and growth is far more regular. Some gardeners use warm water for this purpose, but care must be taken with this as too much heat may destroy the germ of the seed or corm.

STEM ROT A rather vague term used for various diseases that attack the stems of plants. Stem rot may be an alternative name for damping off, foot rot, collar rot, various stem cankers, didymella, sclerotinia or botrytis.

STEPS Steps in the garden can be made in a variety of ways, from simple steps formed by cutting out the soil, to elaborate flights of brick or stone.

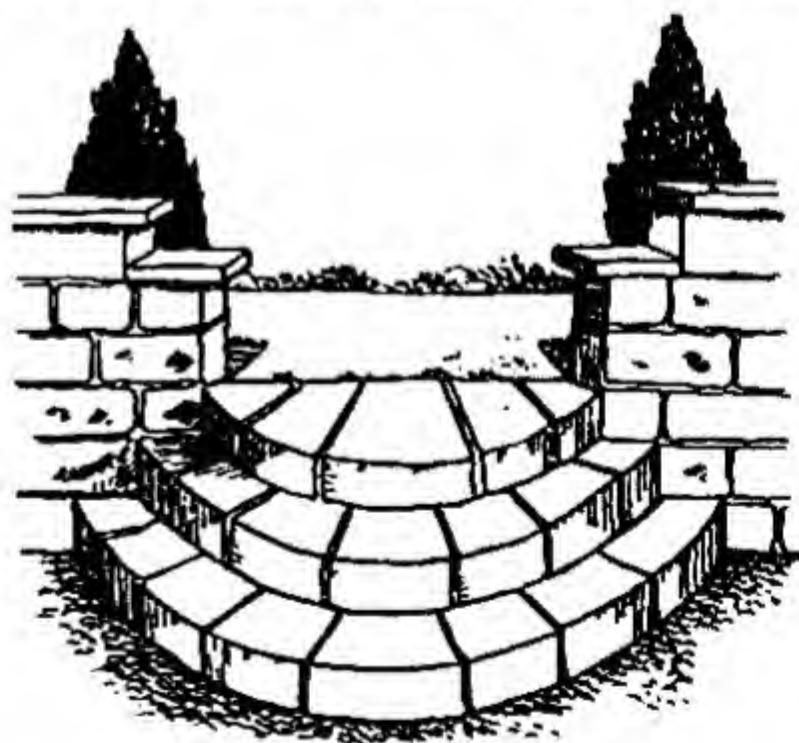
Much the same process is applied to the making of steps in the garden as to steps in any other place, that is the 'riser' or vertical part of each step should always be carefully proportioned to the 'tread' or horizontal part. Very steep, narrow steps are uncomfortable and even dangerous to walk on, while steps which are very broad may be awkward to walk on unless the breadth is carefully proportioned to a normal stride, or strides. Shallow steps are also unsatis-

factory as an average person walking without much concentration, will usually expect a step to be between 6 and 9 inches in height, and may easily move the feet accordingly, despite the fact that the step is only an inch or so high.

Work on the construction of steps should always start at the bottom and proceed upwards. If concrete is to be used as a surfacing material, one-inch-thick planks and pegs made from 2-inch-square quartering should be used to form shuttering for the risers of each step. The step itself can be formed by floating the concrete across it and smoothing with a builder's trowel. Curved steps in concrete can be made by using hard wallboard in place of wood as the shuttering material, as it can be bent easily and evenly round stakes suitably driven in.

Brick used for step-making should always be mortared and the same is true of paving slabs, but steps formed of flat-topped stones may go uncemented. Such steps are often most suitable to use in the rock garden and other parts of the garden, treated in a very natural manner.

Very good steps in a woodland setting can be formed by using untrimmed lengths of tree trunk as the risers, and beaten earth as the step itself. The trunks should be between 6 and 9 inches in diameter and as even as possible in size. They should be well bedded into the soil, and be still further secured by strong posts driven in firmly at each end in such a way as to hold the trunk



Method of constructing steps

back against the soil and prevent it from shifting forwards. The appearance of the steps can be greatly improved by suitable plants on each side and for this purpose ferns or shrubs of low-spreading habit such as heathers, are often the most suitable.

STERILE A name given to any plant or flower which is incapable of producing seed or taking part in the production of seed. Thus the showy, bracted flowers of hydrangeas are sterile, producing neither ovules nor pollen. Some very double flowers are sterile because all the sex organs have been converted into additional petals.

There are certain plants which though not sterile in this absolute sense, are only fully fertile in certain circumstances. For example, many of the sweet cherries, though they have flowers which appear normal in every respect and produce pollen-bearing anthers, pistils and ovules, are quite incapable of producing fruits when pollinated with their own pollen, and even fail when pollinated with pollen from certain other varieties of sweet cherry; yet with pollen from others they prove completely fertile. This phenomenon is usually referred to as self-sterility. It is of great importance to the fruit grower, and much study has been devoted to it. In some fruit trees, notably apples and pears, there is a limited degree of fertility with some varieties when pollinated with their own pollen, but an increased degree of fertility when they are pollinated with pollen from another variety of apple or pear (see *Self-fertile*).

STERILIZATION In gardens the term is frequently applied to treatment applied to the soil, but in this connexion is a little misleading as complete sterilization is seldom carried out nor is it desirable. What is required in certain cases is partial sterilization to destroy harmful organisms, including weed seeds, fungi and insects, but not such complete sterilization as to rob the soil of all living organisms, particularly bacteria.

Broadly speaking, soil sterilization may be carried out in two distinct ways; by heat and by chemicals. In general, heat is more

satisfactory as it is more universal in its application. Chemicals, by contrast, tend to be more selective. For example two of the most popular chemicals used for soil sterilization are formaldehyde and cresylic acid. Of these formaldehyde is more effective against fungi, whereas cresylic acid is more effective against insects. Heat, however, will destroy both fungi and insects with equal efficiency.

Sterilization by heat Soil can be heated by pouring hot water on it, by passing heated steam through it, by baking it in an oven or by passing an electric current through it. Of these the second and fourth are most satisfactory from the gardener's standpoint. Hot water is quickly cooled by contact with the soil and as a result sterilization obtained even by pouring boiling water onto the surface, is extremely superficial. Steam, by contrast, penetrates to all parts of the soil and maintains its temperature far more effectively without making the soil sodden and so damaging its physical structure. Much elaborate apparatus is manufactured for the steam sterilization of soil on a large scale, but in the garden the work can be done quite efficiently by suspending a bag of soil in a copper containing a few inches of water, bringing this to the boil, and placing a lid on top. The bag should be suspended just above the water so that the soil at no time becomes really wet, but is simply exposed to the steam. If the boiling is continued for approximately 20 minutes, the soil should be adequately sterilized. If larger quantities of soil or more elaborate apparatus are being dealt with, a soil thermometer may be used to check temperature. This should be plunged deeply into the soil and the temperature should be raised to about 200 degrees Fahrenheit and maintained at this for about 20 minutes. A considerably higher temperature or longer treatment may result in too great a destruction of life, and make the soil sterile in the sense that it will no longer support plant life adequately.

Sterilization by baking is not very satisfactory as it is extremely difficult to avoid the charring of much useful humus.

Whenever soil is sterilized by heat, however carefully the work is done, it is found

that there is temporary falling off in the availability of certain plant foods, and this must be rectified by the addition of fertilizers. The various John Innes composts (see page 59) have been designed with this end in view.

Sterilization by chemicals Various proprietary chemicals are offered for the sterilization of soil and these should always be used strictly in accordance with the manufacturer's instructions. They will vary from one production to another. The two non-proprietary chemicals most commonly employed are cresylic acid and formaldehyde. Cresylic acid can be purchased in varying strengths, that usually supplied for horticultural purposes being 97-99 per cent. of purity. This is diluted with 39 times its own volume of water, i.e. 1 pint of cresylic acid will need to be diluted with 39 pints (approximately 5 gallons) of water. This is then applied to the soil from an ordinary watering pot fitted with a fine rose. The soil should be thoroughly soaked, which may mean applying 3 or 4 gallons of the solution to every square yard of soil. No plants or seed should be placed in the soil for at least a month after sterilization.

Formaldehyde is usually purchased as commercial formalin, which contains 40 to 42 per cent. formaldehyde. This needs to be diluted with 49 times its own volume of water, i.e. 1 pint of formalin is diluted with 49 pints (approximately 6 gallons) of water. This is applied to the soil in the same manner as the diluted cresylic acid, with the difference that as soon as the soil has been soaked it should be covered with sacks or tarpaulins to trap the fumes given off by the formaldehyde, as it is these fumes which are effective in producing sterilization. When comparatively small quantities of soil are to be dealt with, it is most convenient to spread the soil out thinly, water it with the diluted formalin, and then immediately throw it into a steep-sided heap and cover as described. The covering should be kept in position for at least 48 hours, after which it is removed and the soil which has been heaped should be spread out again so that the fumes can escape. Soil treated in this way should not be used for plants or seed for at least a month.

Sterilization by electricity This method of sterilization is based on the fact that, if an electric current is passed through a substance which offers some resistance to it, heat will be generated. Soil offers such resistance and moreover the resistance of dry soil is considerably greater than that of wet soil. In consequence if two electrodes are separated by a volume of damp soil just sufficient to allow the current to pass through, heat will be generated and the soil will gradually dry out. There will then come a stage at which the soil will be so dry that the resistance will be too great to allow current to pass any longer. The current will, in effect, be automatically switched off and no further heat will be generated. Most electrical soil sterilizers make use of these principles. They differ in detail, but essentially they consist of a box, made of some non-conducting material, with a plate electrode at each end. Damp soil is put in, the box is closed and current, usually at the normal domestic voltage of 230, is switched on. An ammeter on the box shows the flow of current and at first rises to the maximum figure at which the particular sterilizer is designed to work. Gradually the ampere reading drops and when it has fallen to zero sterilization is complete. The current supply is then disconnected and the box is opened and emptied.

STIGMA The end of the pistil, or female organ, of a flower on which pollen is retained. Usually the stigma becomes sticky when the flower is ready for fertilization.

STIPULE A leafy outgrowth at the base of the leaf-stalk.

STOCK A name given to that part of a grafted or budded plant which produces the roots, or to plants grown specifically for the purpose of providing roots for budding and grafting. Thus rose stocks frequently consist of seedlings of the common dog rose *Rosa canina*, or rooted cuttings of *Rosa rugosa* or *Rosa polyantha*. Stocks for apple trees are nowadays generally of some form of Paradise apple, though at one time seedling crab apples were freely employed. Pears are frequently worked on stocks of

quince or seedling pear. The wild gean (*Prunus avium*) is the common stock for cherries, while various plums, usually raised from layers or suckers, are used for stocks upon which to grow garden varieties of plums. Choice rhododendrons are often grafted on stocks of seedling *Rhododendron ponticum*. So the story might be continued for many other plants which are commonly increased by grafting or budding.

It is important to realize that though the tissues of stock and scion (that part of the graft or budded plant which produces the branches) normally remain entirely distinct, the stock can nevertheless influence the growth and behaviour of the scion in many ways. This is very clearly illustrated in the various Paradise stocks used for apples. Some of these tend to dwarf the varieties grown upon them, and to encourage very early maturity and heavy cropping. Others, by contrast, tend to produce much larger trees which reach maturity later in life, though they may continue to live longer than the dwarfed trees.

The influence of the stock on top growth is also clearly seen in roses. Varieties worked on *Rosa rugosa* tend to make a great deal of growth in the first few years, and to flower very freely, but the flowers are seldom of the same high quality, nor are the bushes, as a rule, as long-lived as those on *Rosa canina*.

All these and many other matters must be considered when selecting stocks for any particular purpose. Sometimes it is not possible to get all varieties of one particular kind of plant to grow well on the same stock. A striking example of this is to be found with pears, some varieties of which will not make a proper union with the quince stock. This difficulty can be overcome by the process known as double-working, by which a variety that unites well with quince is first grafted to the stock and then the incompatible variety is grafted on to the compatible pear. The two operations can be carried out at once, and quite a short length of shoot of the compatible pear is sufficient.

It should be observed that all growths which emanate from the stock will be of the same character as the stock, even after this

has been grafted or budded. It is, therefore, important to remove suckers from grafted plants, for if these are allowed to remain they may in time swamp the growth of the scion itself and leave the gardener with nothing but the stock, which is usually a wild form of inferior garden merit. It may be asked why stocks should be employed at all. The answer is twofold; first that there are some plants which it is difficult to propagate vegetatively by any other means than grafting or budding, and the other that the influence of the stock is often of real value to the gardener. This is certainly so with the dwarfing apple stocks to which reference has already been made, as, by using them, the gardener can produce small bushes or even single-stemmed cordon trees which will never make an excessive amount of growth, and will start to fruit in their second or third year. Such trees have obvious uses in the garden.

STOCKHOLM TAR A special kind of tar which is obtained from pine trees and which is of value as a dressing for wounds on trees and shrubs. Unlike ordinary tar it has no harmful effect on plant tissues. By sealing the wound completely it lessens the chance of infection by spores of harmful fungi, or of attack by insects.

STOLON Any shoot which runs along the surface of the soil, forming roots as it goes. (See *Runner*.)



Strawberry stolons or runners

STOMATA The pores found on leaves, mainly on their under surfaces, which can open and close to control the amount of evaporation from the leaf.

STONE This word has two quite distinct uses in the garden. One is its purely literal meaning in connexion with the stone used in building rock gardens, making dry walls, paths, etc. and under these various headings it is dealt with in this book. But stone is also the name given to the seeds of some plants, notably fruits belonging to the prunus family such as plums, cherries, apricots, peaches and nectarines. Unless these seeds or stones are properly formed the fruits themselves do not come to perfection and so stoning, or the production of seeds, is an important feature of the development of these trees. Faulty stoning can be due to poor fertilization of the blossom, lack of water in the soil, or to lack of mineral plant foods in the soil. At one time it was supposed that lime played a particularly important part in the production of the stones of these kinds of fruits. Investigation has not substantiated this idea.

Although the seeds of grapes are not, strictly speaking, stones, the period in the development of the young grapes at which the seeds begin to harden is usually referred to as the stoning period and again it is a time when careful management of the grape vines is essential. Lack of water, too low a temperature and insufficient ventilation can all cause trouble in stoning in greenhouse vines.

STONE CHIPPINGS Broken limestone, sandstone and occasionally granite is frequently used in the rock garden, either as a top-dressing or to mix with the soil, the object in both instances being to provide a greater degree of porosity for those plants that dislike having their roots or crowns wet. As a rule the chippings are of a size that would pass through a half-inch-mesh sieve, though occasionally larger chippings are used. They form an important ingredient of all scree and moraine mixtures (see *Moraine*). A surface layer of stone chippings not only improves drainage round the collar of the plant but also, paradoxically,

keeps the soil beneath both cooler and moister than it would otherwise be. These twin factors will have the effect of encouraging root-growth while discouraging decay around the crown.

Limestone chippings should only be used for those kinds of plants that tolerate free lime in the soil and they are unsuitable for ericaceous plants, including the heathers themselves and their allies the rhododendrons. For these lime-hating plants either sandstone or granite chippings should be employed.

STOOL Any plant that is used solely or mainly for propagation. Thus the old roots of chrysanthemums after the blooms have been gathered are referred to as chrysanthemum stools, their main purpose then being to provide cuttings from which a stock of young plants can be produced for flowering the following year. A stool bed is a bed set apart for the growth of plants that are to be treated as stools, i.e. to provide cuttings or layers. Apple stocks are usually planted in stool beds with plenty of space between the rows, so that the young shoots can be pegged down to right and left and covered with soil so that they form roots. Such a bed of layered apple stocks is correctly referred to as a stool bed.



A typical chrysanthemum stool

STOPPING The removal of the growing tip of a plant with the object of making it produce side branches. Stopping is applied to a great many plants, particularly those of a herbaceous character, but is of primary importance in the cultivation of chrysanthemums and perpetual-flowering carnations. In both these instances it is used to decide the time at which flowers shall be produced. Where carnations are concerned, the first blooms are usually produced about six months after the last stopping, so that if young plants have their growing points removed in April and again towards the end of July, the first blossoms may be expected the following January or February, the precise date varying according to the amount of warmth given during the winter months.

Chrysanthemum varieties vary a good deal in their response to stopping, some varieties producing flower buds within eight or ten weeks of stopping and others taking considerably longer. By studying individual behaviour and by adjusting the stopping dates accordingly, the chrysanthemum grower can exercise a measure of control over the time at which his plants are in bloom, and this can be of great importance in the cultivation of chrysanthemums for exhibition.

Stopping, in the case of the chrysanthemum, has yet a third function, the control of the type of flower bud produced and consequently the number of petals and the character of the bloom. If a young plant is stopped once and then the first flower buds that appear, known as first crown buds, are allowed to develop, the resultant flowers will contain more petals than they would if the plants were stopped twice, when second crown buds would be produced. A third stopping would result in the formation of terminal buds with even fewer petals. Though frequently a large number of petals per bloom is desirable, this is not invariably so. There are some varieties which produce better-formed flowers when stopped twice and so forced to produce second crown buds.

Stopping is usually carried out by pinching out the tip of each stem between first finger and thumb, although some gardeners prefer to use a knife, and, in carnations,

stopping is effected by breaking the shoot off at a joint.



Stopping sub-lateral of a vine. Arrow indicates point of pinching

STORE Any shed, room, cellar etc. set apart as a place in which to keep fruits, vegetables, tubers, or bulbous roots. In general such stores should be cool but frost-proof, dry but not drying. Ventilation is required, but it should not be too free, just a slow movement of air to prevent stagnation. In a heavy, damp atmosphere moulds or other fungi are likely to flourish on the stored fruits or roots. Many tubers are particularly susceptible to frost damage in store, and this is true of both potatoes and dahlias. Even a degree or so of frost penetrating the roots for an hour or so may do them damage, while over-chilling without actual freezing may have an adverse effect on subsequent growth, though the tubers are not themselves obviously damaged by it.

Exception to the rule of a dry and

reasonably airy store must be made for apples, which keep best in a rather damp atmosphere. The ideal for most fruits is a shed with a concrete, brick or wooden floor, but for an apple store a floor of beaten earth is to be preferred, as this will hold more moisture and so prevent fruits from shrivelling unduly. Where it is impossible to provide a store of this type, apples may be kept quite satisfactorily by packing them, about four layers deep, in boxes and standing these one on top of the other so that circulation of air is reduced. The old-fashioned plan of storing apples in single layers on open slat shelves is convenient, but not really conducive to long keeping. This kind of airy storage is, however, ideal for pears.

The more equable the temperature within the store the better, and for this reason specially built store sheds are often provided with roofs of thick thatch. Failing this a lining of thick wallboard is useful in a store shed.



An apple store

STOVEHOUSE Any greenhouse in which a fairly high temperature is maintained throughout the year. Though no arbitrary ruling can be given, it is usual for stove houses to be maintained at a temperature of 70 to 75 degrees even in winter. Such houses are used for the cultivation of tropical plants.

STRAIN All plants that are raised from seed show a certain amount of variation

and this is true even of so-called pure-breeding varieties, such as named varieties of sweet pea or onion. Unless special care is taken in selection, this natural variation will tend to increase and the character of the original variety may deteriorate in consequence. As some seed producers will take more trouble than others in selecting their seed parents, small differences will appear in the same variety purchased from two or three different sources. These variations are known as 'strains'. In consequence, Mr. A's strain of onion Ailsa Craig may be markedly different from Mr. B's strain of the same onion, and not infrequently one strain is to be preferred to another. The term is purely a horticultural one, but if differences of this character become sufficiently marked they may lead to the formation of what would be botanically known as a 'form'. (See *Classification*.) Even in vegetatively propagated plants small differences of character may creep in, owing to minor mutations or to the effect of disease and other outside causes. This can often be seen quite clearly in stocks or chrysanthemums. If plants of the same variety are obtained from two different sources, one batch may be considerably better than the other, and this superiority may be maintained even when the plants are grown under identical conditions for several years. It is legitimate to refer to this kind of variation as a difference in strain.

In order to keep a good strain in being it is essential to save seed or select cuttings only from those plants which conform in every detail to the best characteristics of the strain.

STRATIFICATION A term used by gardeners for the practice of exposing seeds to frost to hasten or improve germination. Some seeds germinate much better after a period of stratification than without it. This is true of hard-coated seeds of some hardy plants including numerous trees and shrubs. Seeds to be stratified are frequently placed in shallow pans or boxes and covered with sand, after which they are placed outdoors in a fairly exposed position and left there throughout the winter without

any protection. The following spring the seeds are sown in the ordinary way, either outdoors or in boxes or pans of soil. When seeds are stratified in this way, it is often wise to protect the boxes or pans from the attacks of mice and this may be done by placing fine-mesh wire netting over them.



Stratification of seeds in sand

STRATUM A layer of rock. In many natural formations the rock is in superimposed layers referred to as strata. These layers usually follow the same plane which may be anything from horizontal to vertical according to the degree of subterranean pressure to which the rock has been subjected. Limestone and sandstone are typical stratified rocks and when they are used for rock garden construction it is desirable that the impression of stratification should be maintained by setting the rocks to simulate superimposed layers.

STRAW Wheat, oat or barley straw is useful to the gardener to improve drainage and aeration, to improve the texture of his soil, to add plant foods to it and also as a protective material. For the first purpose straw may be dug in exactly as it is obtained, or it may be inserted vertically in the soil. Vertical straw 'walls' in the soil have been found particularly useful in the cultivation of tomatoes under glass. There are two ways of getting straw into the soil vertically; one to apply it during the ordinary process of digging or half-trenching, when a thick wall of straw is laid as nearly vertical as possible against the face of each trench as it is completed, and

then the soil from the next trench is thrown against it; the other is to make a V-shaped cut in the soil to the full depth of a spade, lay straw across this cut and push it in with a spade. Such walls have a marked effect on drainage and aeration if they are spaced not more than a yard apart.

When straw is dug directly into the ground, care should be taken to mix it with the soil as thoroughly as possible and not leave it in thick layers, as these may remain undecayed for a considerable period and actually hinder rather than help drainage. It is really best that the straw should be chopped before it is dug in. Fresh straw has little manurial effect—indeed it may actually depress the fertility of the soil for a time by lowering the amount of nitrogen available. This can be overcome by first composting the straw, either with green refuse and dung, or with chemicals. (See *Composting*.) Well-composted straw may have almost as high a manurial value as farmyard or stable manure and can be dug in in exactly the same way and at similar rates.

As a protective material straw may be used to keep out frost, as, for instance, in a potato clamp (see *Clamp*), to keep off rain when used as a thatch, or to prevent damage by bruising or splashing, as when straw is spread beneath fruit trees or round strawberry plants. It often pays to place a thick layer of straw beneath varieties of apples, such as Beauty of Bath, which are prone to sudden heavy fruit drop before they are fully ripe, as the straw will prevent bruising and enable many of the windfalls to be picked up undamaged. Straw used for strawberry beds should be clean and fresh; old or damp straw may contain fungi which will prove harmful to the fruits.

STRAWBERRY BLOSSOM WEEVIL

A small and active weevil very similar to the strawberry leaf weevil, which attacks the blossom stems, cutting them through and causing them to fall off. A remedy is to dust with derris or DDT as soon as damage is observed.

STRAWBERRY LEAF WEEVIL This very small and active weevil chews the stems of both strawberry leaves and fruits,

causing these to break as a result. It is often very difficult to discover the weevils themselves as they hide when disturbed, but the damage they cause is distinctive. The remedy is to dust with derris or DDT as soon as any damage is noted.

STRAW MATS Mats about a foot square with a central hole and used as protection for strawberry plants in place of the more conventional straw. One mat is placed round each plant. If removed as soon as the crop has been gathered and stored in a dry place the mats will last for several seasons.

STREAK A general name given to several diseases caused by viruses all of which produce sunken brown or blackish spots and streaks on stems, leaves and, in tomatoes, the fruits. Plants are weakened and may eventually be killed. Streak is common in tomatoes and sweet peas. It is spread by sucking insects such as greenfly and also on the blades of knives used for removing side shoots. Affected plants should be removed and burned. Sucking insects should be killed by spraying occasionally with nicotine or HETP or, under glass, by fumigating with nicotine. Pruning knives should be sterilized with lysol. Plants which have an adequate supply of potash often escape injury, so it is desirable to give a dressing of potash fertilizer prior to planting tomatoes or sweet peas.

STRIKE A garden term used to denote the rooting of a cutting. Thus to 'strike a cutting' is to treat it in such a way as to induce it to form roots, and a 'struck cutting' is one that has formed roots. The term is also used for a dry measure; in this sense a strike is equal to two bushels.

STUB This term is not much used nowadays in gardening, but has survived in its adjectival form, stubbing. A stub is the stump of a tree left after felling, and a stubbing mattock is a tool used to grub out such stubs.

STUMP, see *Stub*.

STYLE The stem of the pistil or female organ of a flower which joins the stigma to the ovary.

SUB-SHRUB, see *Suffruticose*.

SUBSOIL That part of the soil which lies immediately beneath the surface soil. There is no specific depth at which the surface soil ends and the subsoil begins. This will vary from one class of soil to another. It is not a question of depth but of character, for there is always a marked difference in the appearance and the texture of the subsoil and that of the surface soil. Thus with soil on a chalk down there may be only two or three inches of surface soil, comparatively dark in colour and containing the roots of grasses and other herbs. Below this cultivatable soil lies a solid bed of chalk. By contrast, in some river valleys where the soil is alluvial in character there may be several feet of surface soil of uniform texture before there is any marked change in character and the subsoil commences. The way to discover the depth, position and character of the subsoil is to dig a deep trench with at least one clean vertical face on which the character of the soil can be studied. On the character of the subsoil the fertility of the surface soil may depend to a considerable extent. Thus if the subsoil is stiff clay, drainage will be impeded and the surface soil will be liable to become cold, water-logged and sour. By contrast a gravel subsoil will encourage quick drainage and a dry warm surface, but by allowing water to pass through so freely may cause considerable leaching of valuable plant food from the surface soil.

Subsoil is seldom as fertile as surface soil but its fertility can often be improved if it is broken up and manure or compost added to it. Part of the value of deep cultivation lies in the improvement of the subsoil in this manner.

SUBTROPICAL A term which has no precise definition but is used in gardens to describe those plants which come from regions near to the tropics of Cancer and Capricorn, and which in gardens require warm greenhouse rather than hothouse treatment. Many subtropical plants can be placed outdoors for the summer months, but all are injured by the least frost.

SUCCULENT A term applied to all plants with thick, fleshy leaves or with thickened or fleshy stems which take the place of leaves. The cacti comprise one group of succulent plants characterized by certain botanical features which bring them within the family *Cactaceae*. Many succulent plants are found wild in regions which are subject to long periods of drought, and the succulent habit is of benefit to the plants by enabling them to withstand such periods without undue loss of moisture. It is not true, however, that succulents require to be kept comparatively dry all the year round, for they must have periods of fairly abundant moisture in which they can replenish their stores of sap. Very often in partly desert regions, there is heavy rainfall for a time. In cultivation it is usually desirable to water succulents fairly freely while they make their growth and even during the dormant season to give them some moisture.



A typical succulent

SUCKER Any growth which comes direct from the roots of a plant may be called a sucker. The term is usually confined in gardens to those shoots which come from the roots of grafted or budded plants. Such suckers have a special importance as they will partake of the character of the root stock and not of the scion which has been grafted or budded upon it. If such suckers are allowed to remain, the plant will in consequence have two distinct types of top growths, and as stocks are frequently more vigorous than the plants worked upon them, the suckers will in time tend to

smother the scion growth and kill it altogether. Many bushes of *Rosa rugosa* to be seen in neglected gardens have arisen in this way, the garden rose having originally been budded on *rugosa* stock and the latter having been allowed to produce suckers indiscriminately until eventually the garden rose was destroyed, and only the suckers remained. Suckers from grafted or budded plants should, in consequence, always be removed at the earliest possible opportunity. Care should be taken to cut them off cleanly, close to the roots from which they grow. If any stumps are left, fresh suckers are likely to be produced from them. Frequently suckering is caused in the first instance by bruising the roots through careless soil cultivation. A callus forms over each wound and from this callus adventitious buds and eventually sucker growths are produced.

Suckers produced by plants which are growing on their own roots, as distinct from grafted or budded plants, are sometimes of value as a means of propagating the plant. The suckers can be detached with a few roots and planted on their own to form new specimens. This kind of propagation is commonly used for raspberries and also such ornamental shrubs as *Rhus typhina* and bamboos.



Suckers

SUCKER, APPLE A small insect, closely allied to greenfly and not unlike it in appearance, which attacks the unopened or opening blossoms of apples. At first this insect is creamy white and wingless, but later it becomes green and develops a pair of transparent wings. It produces a whitish waxy substance in the form of globules or threads. This pest must not be confused with the maggots of the apple blossom weevil which also attack apple flowers, but in this instance cause them to become capped, i.e. covered by the brown unexpanded petals. Apple sucker is destroyed by tar oil winter spraying in January or DNC winter spraying in early March. It can also be killed by spraying with nicotine or HETP just before the blossom opens.

SUFFRUTICOSE A term used to describe perennial plants (sometimes known as sub-shrubs) in which the upper part is soft and herbaceous, but the lower part is woody. The wallflower is a familiar example.

SULPHATE OF AMMONIA A chemical fertilizer which supplies nitrogen to the soil. It is readily soluble and, in consequence, quick in action, and most suitable for application during the spring or summer months. An overdose can produce severe scorching of leaves and stems. In consequence sulphate of ammonia is sometimes used as a weedkiller on lawns as it tends to slip off the erect and narrow blades of grass, but to lie on the broader and flatter leaves of daisies, plantains, etc. and scorch them. For this purpose it is usually mixed with sand and sulphate of iron, the former ingredients to enable the sulphate of ammonia to be spread evenly and the latter to kill toadstools and other fungi. The proportions usually recommended for this purpose are: sulphate of ammonia 3 parts by weight, sulphate of iron 1 part by weight, fine silver sand 20 parts by weight; mix thoroughly, keep dry and use at the rate of 4 ounces per square yard during dry weather, in spring or summer. Sulphate of ammonia as a fertilizer is used at rates from $\frac{1}{4}$ to 1 ounce per square yard. Sulphate of ammonia can also be mixed with

most other fertilizers except those containing lime. Analysis is 20.6 per cent. nitrogen.

SULPHATE OF COPPER, see *Copper Sulphate*.

SULPHATE OF IRON A chemical sometimes used as a fertilizer and sometimes as a fungicide. Iron is one of the essential plant foods but it is usually present in the soil in sufficient quantity for the needs of plants. When lacking there may be considerable yellowing of the foliage though similar symptoms are also caused by lack of magnesium. Iron deficiency is most likely to occur in soils that are heavily supplied with calcium carbonate. It is then not so much that there is actual shortage of iron, as that the iron is rendered unavailable by the presence of the calcium carbonate. When these conditions exist the application of sulphate of iron or other iron salt to the soil has little beneficial effect, as the fresh supplies are promptly locked up once more by the calcium carbonate. Some benefit may be obtained by spraying the foliage of the plants with a solution of sulphate of iron at the rate of $\frac{1}{2}$ to 1 ounce per gallon of water. More lasting effects can be produced by correcting alkalinity of the soil due to excess of calcium carbonate. As a fungicide, sulphate of iron is principally used for the destruction of toadstools and other fungi on lawns, for which purpose it is either mixed with sulphate of ammonia and sand (see *Sulphate of Ammonia*), or applied as a solution at the rate of 4 ounces per gallon of water, the soil being freely wetted with this solution from an ordinary watering can fitted with a fine rose.

SULPHATE OF MAGNESIUM (Epsom Salt) Magnesium is one of the essential plant foods and is usually present in the soil in sufficient quantity for the needs of plants. Where it is lacking, considerable yellowing of the foliage may occur, particularly between veins of the leaves, but somewhat similar symptoms can be caused by iron deficiency. (See *Sulphate of Iron*.) When magnesium is short the deficiency can be rectified either by dressing the soil with sulphate of magnesium or by spraying

the foliage during the summer months with a solution of sulphate of magnesium. For the first purpose the chemical is used at the rate of 1 ounce per square yard; for the latter it is dissolved in water at 2 to 3 ounces per gallon and applied to the plants as a fine spray. Late winter or early spring is the most suitable time for soil application; late spring or early summer for application as a spray.

SULPHATE OF POTASH The most valuable potash fertilizer for use in the garden. Sulphate of potash contains 48 per cent. of potash and is used at rates varying from $\frac{1}{2}$ to 1 ounce per square yard. It can be mixed with most other fertilizers including sulphate of ammonia and superphosphate of lime. It is usually the best form in which to add potash to compound fertilizers. It dissolves readily in water and in this form can be used as liquid manure at the strength of $\frac{1}{2}$ to 1 ounce per gallon. It can be used at any time of the year.

SULPHIDE OF POTASSIUM (Liver of Sulphur) A chemical commonly sold as liver of sulphur and at one time a favourite fungicide for the control of various plant diseases. It has to a great extent been superseded by lime sulphur and by fungicides containing copper, but it is still a valuable control of certain diseases. Its chief drawback is that the raw material varies considerably in strength and so any formula given may prove to be too weak to be fully effective on one occasion and yet so strong on another occasion as to cause some scorching of foliage. Nevertheless this drawback has been somewhat exaggerated. If potassium sulphide is used at a strength of 1 ounce to 5 gallons of water with 4 ounces of soft soap added as a spreader, it is usually effective in the control of mildew and similar diseases, and seldom causes any damage.

SULPHUR In one form or another sulphur is valuable as a fungicide for the control of plant diseases caused by fungi, and is also occasionally used to decrease the alkalinity of soils that have an excess of calcium carbonate or some other alkaline

substance. Various preparations of sulphur are used for the first purpose, including liver of sulphur (sulphide of potassium, *q.v.*), lime sulphur (*q.v.*), colloidal sulphur and plain flowers of sulphur. The last-named is employed as a dust (which can be obtained coloured green, so that it does not show too much on the leaves) without the addition of any carrying or spreading agent, and is particularly valuable for the control of mildew and similar diseases under glass. It can be dusted on to foliage and even fruits without causing injury. It has the added advantage that it does not affect the humidity of the greenhouse in which it is applied, as it might if a spray were used. Sulphur has also some value as an insecticide, particularly against red spider and similar mites. (See *Fumigation*.)

SULPHUR-COPPER DUST A mixture of sulphur and copper sometimes used as a fungicide for dry application to the leaves or stems of plants. It is prepared by mixing 10 parts by bulk of hydrated lime, 3 parts of flowers of sulphur, and 3 parts of finely powdered copper sulphate. This mixture is particularly effective against foot-rot disease of all kinds, for which purpose it is sprinkled on the lower part of the stems of plants liable to be attacked.

SULPHURIC ACID, see *Acid*.

SUMMER PRUNING Any pruning done during the months of June, July or August. The purpose of summer pruning is usually to check the vigour of trees and shrubs and to encourage the formation of flower buds. (See *Pruning*.)

SUN BLIND, see *Blinds*.

SUNDIAL Once upon a time the only reliable method of telling the time, the sundial has now become principally an object of adornment in the garden. Nevertheless even when used purely in this way, it is desirable that sundials should be properly constructed and set in the correct manner so that they do fulfil their purpose as time indicators. To do this the first thing is to discover the latitude of the district in

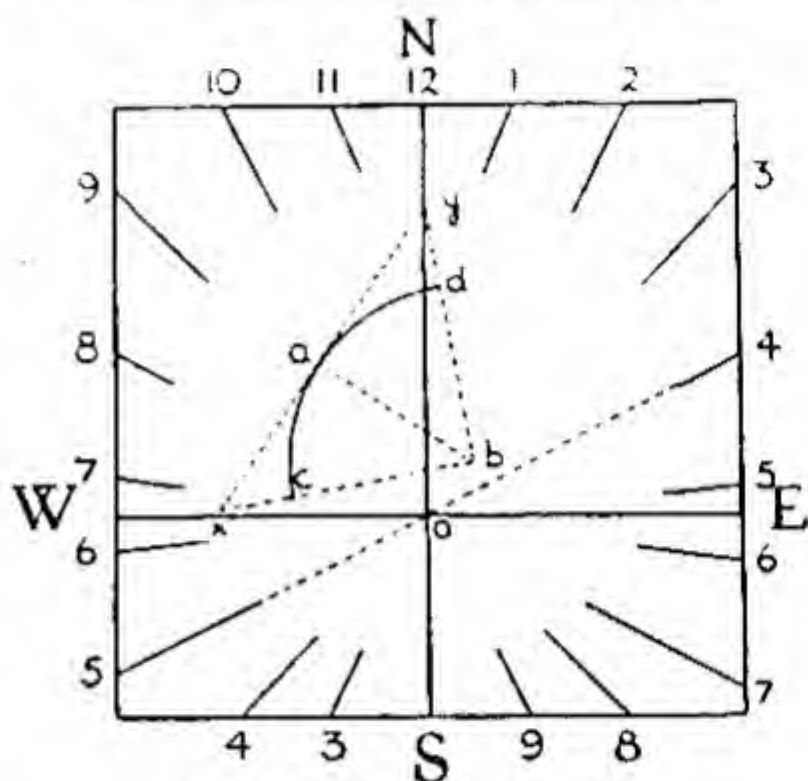
which the garden is situated. For example the latitude of London is $51\frac{1}{2}$ and that of Paisley $55\frac{1}{4}$. Draw a vertical line down the centre of the sundial plate, from north to south. About two-thirds down this line draw another line across the plate at right angles, from west to east. Mark a spot on this line one-third of the distance between the left-hand side of the plate and the point where the two lines meet. From this spot draw a line in a north-easterly direction at an angle to the west-east line equal to the degrees of latitude (e.g. $51\frac{1}{2}$ for London). This diagonal line should extend up to the north-south line. This diagonal should now be divided in half, and from the centre point (A on the drawing) a line drawn at right angles to it in a south-easterly direction. This new line should be half the length of the diagonal (xy). Its extremity should now be joined with the ends of the diagonal line, so forming two right-angle triangles (ABx and ABy) with one line (AB) common to each. Using this common line (AB) as a radius, draw an arc (cd) from Bx to By and then divide this arc into five equal parts, (using a protractor with Bx as the base line the angles will be 18° , 36° , 54° , and 72°).

Lines drawn from the centre point (O) (where the north-south and west-east lines cross) through these division marks on the arc will give the 11, 10, 9 and 8 o'clock points on the edge of the plate. The 7 o'clock point is obtained by drawing a line through Oc. The 6, 7, 8 and 9 o'clock marks on the east side of the plate are obtained by extending through O lines from the 7, 8, 9 and 10 o'clock marks already made on the west side. The remaining hour marks (3, 4, 5 and 6 o'clock) on the west side, are made by reproducing the spacing of the 6, 7, 8 and 9 o'clock marks on the east side. Lines drawn from the 3, 4, 5 and 6 o'clock marks on the west side through O will give the 2, 3, 4 and 5 marks on the east side. The 1 o'clock mark on the east side is obtained by measuring the space between 12 o'clock and 11 and reproducing this.

The gnomon or shadow caster should be about one third of the length of the north-

south line and the angle it makes from the horizontal should be that of the latitude. It should be placed at right angles to the dial along the 12 (N) line.

Note that the west-east line is discarded after the hour marks have been made.



Marking out a sundial plate

SUPERPHOSPHATE OF LIME A phosphoric fertilizer which is of great value because of its ready solubility in water, and the speed with which, in consequence, it produces an effect on plants. It can be mixed with many other fertilizers and is the form of phosphate most commonly used in compound fertilizers. Despite its name it contains no free lime, and is valueless to improve the condition of soils which are too acid. Because of its ready solubility it is most suitable for application in spring or early summer. It is a fine greyish powder which is apt to clog and cake if it becomes damp. If scattered carelessly on young foliage, it may cause some scorching. Superphosphate of lime varies considerably in analysis, the lowest grades containing about 13 per cent. of soluble phosphoric acid and the best grades 18 per cent. The analysis is sometimes quoted in terms of phosphate of lime which gives a figure 2.18 times greater than the quotation in terms of phosphoric acid. For instance, a sample of phosphoric acid described as containing 40 per cent. phosphate of lime is the equivalent of a sample described as containing 18 per cent. phosphoric acid. Superphosphate of lime is applied at rates varying from 1 to 3 ounces

per square yard or, if dissolved in water, at $\frac{1}{2}$ to 1 ounce per gallon.

SUSSEX TRUG A shallow, oblong basket with a central handle, made from thin, overlapping boards, usually of chestnut. These baskets are made in various sizes and are very useful in the garden for carrying weeds, crops, tools, etc.



A Sussex trug basket

SYMBIOSIS The co-partnership of two living organisms for the benefit of both. Thus many orchids are dependent upon certain fungi for part of their food supply and the fungi in turn obtain some of their food from the orchids. A similar partnership may be observed between rhododendrons and soil fungi, and also between some conifers and fungi. The nodules found on the roots of many leguminous plants, such as beans, peas and clover, contain bacteria which are useful to the plants because they can fix nitrogen from the air. Sometimes the gardener can take active steps to promote such symbiotic associations, either by introducing the necessary organism or by producing in the soil conditions which favour those organisms.

SYNONYM An alternative name. In botany many plants have at different times been known by different names and it is part of the systematic botanist's task to discover which is the correct name. Others may be listed as synonyms.

SYRINGE Metal syringes of various

kinds are used both for the application of insecticides and fungicides and also for damping the foliage of plants and maintaining a moist atmosphere in the greenhouse or frame. The syringe should, for preference, be made of brass and be supplied with at least two alternative nozzles—one giving a fine mist-like spray, and the other a heavier and more wetting spray. A third nozzle, giving a solid jet is also useful.

Syringeing can be an important item in the management of greenhouse plants, also of cuttings in the propagating frame. By keeping the foliage damp, loss of moisture by evaporation is cut down to a minimum, without necessity for wetting the soil heavily at the same time, and this is often essential in the care of plants that like a moist atmosphere but do not appreciate a very wet soil. In some instances where it is not desirable to wet the foliage directly because this might cause decay or sun scalding, the syringe is used on the paths and stagings of the greenhouse to keep these thoroughly damp and so increase the humidity of the atmosphere. (See *Damping Down*.)

SYSTEMIC A term applied to certain insecticides and fungicides which enter the sap of the plants to which they are applied instead of remaining solely on the outside. In consequence only those insects or fungi are destroyed which actually feed on the sap or tissues of the plant. Useful insects and fungi are unharmed. Another advantage of the systemic insecticide or fungicide is that it is more readily spread all over the plant as it goes wherever sap goes. External applications, by contrast, may miss many parts of the plant they are meant to protect. A serious drawback of systemic insecticides is that many are extremely poisonous to warm blooded animals (including human beings), as well as to insects. As they are within the plant it is impossible to get rid of them by wiping or washing and even cooking may not remove them. Search is continuing for chemicals which, while systemic in action, are not poisonous to warm blooded animals, or which lose their poisonous character soon after being absorbed by the plant. Schradan (*q.v.*) is a chemical of

this type. So far systemic fungicides have not progressed beyond the laboratory stage as the chemicals used are too expensive for field or garden application. See also *Sodium selenate*.

TAKE This term is used in two different senses. In one it is synonymous with 'strike' or 'root', so that a cutting is said to have 'taken' when it has formed roots. In the other sense it is used by chrysanthemum growers to describe the selection of buds which are to produce flowers. Those buds which are selected or retained are then said to have been 'taken', a somewhat confusing use of a word which might more reasonably be supposed to mean that the buds have been removed.

TAP ROOT Strictly speaking the first root produced by a seedling which is usually undivided and which plunges straight down into the soil, but the term is also used more loosely to denote any strong root growing downwards. With some plants it is natural for the first root to continue its

course unchecked, and occasionally, as in the carrot and parsnip, this is an important feature of the plant from the standpoint of its garden utility. In other instances it is natural for a root to branch after a time to produce further roots which spread horizontally in the soil. Occasionally it may be desirable to force this branching of the tap root before it would naturally occur. Many gardeners believe that this is so where most brassicas and allied plants such as wall-flowers are concerned, and they consider transplanting the seedlings of these plants as important, not only because seedlings are thereby given more space, but also because, in transplanting, the tap root is broken and the plant is forced to produce branch roots. It is widely believed that plants with tap roots tend to make crarer and more vigorous growth than those with roots of a more branching character, though it is by no means certain that this is, in fact, true. Nevertheless, because of this belief it is often advised that, if fruit trees make gross shoots and refuse to fruit, the soil should be excavated round the trunk and any tap roots found should be severed, only the horizontal or nearly horizontal roots being retained.

TAR Coal tar is serviceable in the garden as a preservative for wood but it should not be brought into contact with living plants, though it is by no means so damaging to these as is its near ally creosote. (See also *Stockholm Tar*.)

TAR DISKS A device sometimes used



A typical tap root

R



Placing tar disks round cabbage plants

to protect cabbage and allied plants from the cabbage root fly. The disks are circular pieces of tarred felt slit to a small hole in the centre so that each can be opened, slipped round the stem of a brassica seedling and then pressed firmly on to the surface of the soil. Disks are usually about 3 inches in diameter and their value is due to the fact that they prevent the female flies from laying their eggs in the soil near the base of the plant.

TAR DISTILLATE A general term applied to various substances obtained by distilling tar, but in garden usage the term is generally applied to those distillates which are employed in the preparation of tar oil winter washes for fruit trees.

TAR OIL WINTER WASH A preparation of tar distillates which is valuable for application to fruit trees in winter, principally to kill the eggs of various insects particularly aphides, partly to destroy scale insects and hibernating caterpillars, and partly to clean the bark of algae, lichens and other unwanted growths. Tar oil winter washes are prepared both as oils which will mix with water and also as emulsions, and with all these manufacturer's instructions regarding strength and mixing should be followed. The standard strength for fruit trees is usually $2\frac{1}{2}$ pints to 5 gallons of water. Tar oil washes are all very caustic to foliage and so can only be applied with safety while the trees are completely dormant. If used in orchards with a covering of grass they will usually cause considerable browning of the grass but it generally recovers quickly. It is desirable that tar oil washes should be applied in the form of a spray at considerable pressure, partly because the pressure will help to drive the spray into the crevices of the bark in which eggs are most likely to be, and partly because it helps to break the emulsion and so allow the tar oil to come into direct contact with the eggs or insects which are to be destroyed.

TARRED TWINE Twine that has been steeped in tar, or one of the tar distillates, to make it resistant to decay. Tarred twine

can be purchased in various thicknesses and is a serviceable material for use where the ties must remain in good condition for a considerable period.

TARSONEMID MITES Several related insects are known by this general name, all similar to red spiders in appearance and related to them. They attack many different kinds of plant including strawberries, begonias, cyclamen and fuchsias. The mites vary in colour from near white to light brown. They are found on the undersides of the leaves, from which they suck the juice, causing them to curl up and become discoloured with purplish spots or blotches. Eventually the leaves become very brittle. Flower buds may be destroyed or become distorted. Tarsonemid mites can be destroyed by spraying with HETP or by dusting with flowers of sulphur or spraying with lime sulphur, though lime sulphur cannot be used with safety on greenhouse plants. With strawberries, plants may be sprayed with winter-strength lime sulphur in April, and young plants prior to planting may be immersed for 20 minutes in water at 110 degrees Fahrenheit.

TAXONOMY The study of the form and classification of plants. See *Botany and Classification*.

TEMPERATURE In the case of every seed or plant there is a minimum and maximum temperature below and above which it suffers injury; a minimum temperature below which growth ceases though the plant is not injured, and an optimum temperature at which growth is most rapid. Obviously it is an essential part of the gardener's art to know approximately what these temperatures are with respect to every plant which he proposes to cultivate. There are not many seeds which germinate at temperatures below 45 degrees Fahrenheit and the majority of seeds of greenhouse or half-hardy plants require temperatures between 55 and 70 degrees to ensure germination. Most plants from temperate regions grow freely in temperatures between 50 and 70 degrees. Plants from tropical regions usually require tempera-

tures between 65 and 80 degrees for rapid growth. These are general figures to which many exceptions would have to be recorded.

Plants can become accustomed to temperatures considerably different from those to which they would normally be exposed, and having become so accustomed, may be damaged by temperatures which they could normally have endured. It is for this reason that comparatively hardy plants which have been grown for a period in the greenhouse become more tender than they would normally be, and must be accustomed by gentle stages to ordinary outdoor conditions. Contrariwise, many plants which, when first introduced to this country appear to be too tender to be grown outdoors during the winter, gradually become acclimatized and eventually can be left outdoors with safety, except during the most severe winters.

Exceptionally high temperatures can do quite as much damage as low ones and one important item in the management of greenhouse plants in the summer, is to prevent the temperature from reaching excessive heights during spells of very bright sunshine. Shading, ventilation and syringing all help to prevent these damaging temperatures being reached.

TENDER A rather vague term used in several different ways when applied to plants. Perhaps the best definition of a tender plant would be one that is injured by frost, but in many instances plants are said to be tender when they will not stand outdoors without protection in an ordinary winter. Such plants may be able to withstand a few degrees of frost, but will succumb when the temperature reaches those lower levels which are commonly experienced at some time during the winter in all except the mildest parts of the British Isles. Degree of susceptibility to frost may differ quite a lot according to the stage of growth and the conditions under which the plant has been grown. Thus young growth is usually more tender than old growth as a result of which spring frosts are usually more damaging than autumn or winter frosts. Also it is usually considered that

shoots or leaves which are very full of moisture are more likely to be injured than those that are a little less turgid. In consequence, it is often advised that tender plants grown in poorly heated greenhouses should be kept rather dry during cold weather.

TENDRIL Thin, usually curved, organs produced by some plants as an aid to climbing. Tendrils may be modified leaves or leaflets or modified shoots. Familiar examples of plants which produce tendrils are peas, passion flowers and grape vines.

TEPAL The individual segment of any flower in which there is no clear distinction between sepals and petals. The term is most commonly used in describing the flowers of magnolias.

TEPP The abbreviation used for a chemical closely allied to HETP and used for the same purpose. It is poisonous in the same way as HETP and like that chemical soon decomposes on exposure to moisture. It is twice as powerful as HETP for insecticidal purposes and the usual dose is 4 ounces per 100 gallons of water, plus 8 ounces of wetter.

TERRACE Strictly speaking a raised but level place. In gardens the term is usually applied to level spaces created from naturally sloping ground. It is important when terracing is carried out, first to remove the surface soil and stack it in some convenient place, after which the necessary alterations in level can be carried out by moving the sub-soil. When this has been completed the surface soil is returned and spread evenly over the terraced ground. If this precaution is not taken much of the top soil may be buried far beneath the surface and infertile sub-soil brought to the top. Terraces are usually retained by walls built either with or without cement. Well-proportioned terracing can add greatly to the architectural interest and beauty of gardens on sloping sites.

TETRACHLORETHANE A highly volatile liquid used as a fumigant to kill white fly under glass. (See *Fumigation*.)

TETRAPLOID A plant with twice the number of chromosomes normal for the species to which it belongs. See *Polyplloid*.

THERMOMETER Instruments for measuring temperature are of great value to the gardener and particularly to the greenhouse owner. For garden purposes the Fahrenheit scale is almost invariably used, and on this freezing point occurs at 32 degrees, and boiling point 212 degrees. On the centigrade scale, which is employed on the Continent and in America, freezing point is at 0 degrees and boiling point 100 degrees. In order to convert Fahrenheit readings to centigrade readings, first subtract 32 and then multiply the remainder by 5, and divide the product by 9. To convert centigrade readings to Fahrenheit, reverse this procedure, i.e. multiply by 9, divide by 5 and then add 32. In addition to the ordinary thermometer, it is possible to buy thermometers which automatically register the minimum temperature after being set, and others which will, in a similar manner, register both the maximum and minimum temperatures after being set. For greenhouse purposes maximum- and minimum-registering thermometers are very desirable as considerable fluctuations can occur while the gardener is away from the house. Many failures with greenhouse plants are due to low night temperatures which are unsuspected by the greenhouse owner, but which would be revealed by a minimum-registering thermometer. Special thermometers can be obtained for plunging into soil and registering the temperature of this. These are particularly useful in the formation of mushroom beds and compost heaps and when soil is sterilized by heat. Another type of thermometer is the wet-bulb thermometer which can be used to estimate the humidity of the atmosphere, and also, from this information, to predict frost. (See *Hygrometer*.)

THINNING The process of reducing the number of plants in a bed or other place so that those which remain have more room to develop, of reducing the number of shoots or branches produced by any one plant, or of reducing the number of flowers

or fruits it produces. Thinning of plants may be applied at one extreme to seedlings in a seed bed, and at the other to orchard or forest trees in a plantation. The thinning of seedlings is particularly important with those kinds of plant which are sown where they are to mature, e.g. many vegetable seedlings such as carrots, lettuces, turnips, beetroots, etc., and the seeds of most hardy annuals such as calendulas, godetias, eschscholzas and cornflowers. The work should always be done as soon as the seedlings can be handled conveniently. Care should be taken not to disturb unduly those seedlings that are to remain. If the seedlings to be thinned are crowded together, it may be necessary to press two fingers down on to the soil, one on each side of the plant to be retained, so holding the plant in position while the surrounding seedlings are pulled out. It is often a good plan to spread thinning over two operations, in the first of which the plants are left at least twice as thick as they will ultimately be required. This will allow for any casualties, and a final thinning can be carried out a few weeks later.

In orchards, it is common practice to grow some of the trees on vigorous stocks which will eventually produce trees of considerable size, but will be slow in bringing these into bearing, and to interplant these permanent trees with other temporary trees, often known as fillers, worked on dwarfing stocks which will keep them small and encourage them to fruit while still quite young. Then, after 10 or 12 years, the fillers are removed and the permanent trees permitted to occupy the whole of the space.

Reduction of the numbers of flowers or fruits produced by fruit trees may be necessary to prevent over-cropping, to encourage regular bearing, and to improve the quality of the fruit produced. If cooking apples of large size are required, it is frequently necessary to reduce the number of fruits that set, and this should be done in two stages, first when the fruitlets are the size of small marbles and finally when they are as large as walnuts. Dessert apples of great size are not desirable, and thinning of these is only necessary when very heavy crops are produced. Grapes almost always



Thinning bunches of grapes

require considerable thinning. This is done with pointed scissors specially manufactured for the purpose. It should be commenced about a fortnight after the berries begin to form, and should be continued a little at a time until the stoning period is completed. It is customary to begin thinning at the bottom of the bunch, and to thin this part of the bunch considerably more drastically than the top and shoulders.

Peaches and nectarines frequently require considerable thinning. If fruits of good quality are to be produced they should be spaced at least 9 inches apart on the branches, though nectarines may be a little closer than peaches.

In all thinning care should be taken to remove any fruits which are in any way damaged or likely to be misshapen. In clusters of apples and pears the central fruit, sometimes known as the crown fruit, is often of poor shape. In consequence exhibitors usually remove these crown fruits.

Thinning of branches is often desirable in trees, and particularly fruit trees, that have become overcrowded. The purpose here is to allow light and air to penetrate more freely to the leaves, and to encourage the production of new growth by concentrating sap on a reduced number of buds.

Thinning of shoots may be necessary where some herbaceous plants are concerned, particularly if flowers of large size are required. Thus, when delphiniums are grown for exhibition, the young shoots are usually reduced in number, not more than five being retained even on sturdy plants

two or three years old. The quality of michaelmas daisy flowers can be greatly improved by thinning the stems at an early stage, and large trusses of phlox can be obtained in the same way.

When roses, dahlias or chrysanthemums are grown for exhibition, considerable shoot-thinning is usually carried out. Exhibition sweet peas are produced on plants restricted to a single stem each—an extreme example of shoot-thinning.

THIOCYANATE A chemical which is sometimes used with petroleum oil as a winter wash for application to fruit trees. This wash is particularly effective in the control of woolly aphis and red spider and has the merit that it can be applied in mid-March, later than most other winter washes. It must be purchased as a proprietary article and manufacturer's instructions regarding strength should be followed; as a rule from $1\frac{1}{2}$ to $2\frac{1}{4}$ pints of concentrated fluid to 5 gallons of water.

THIRAM A fungicide particularly serviceable in controlling tulip fire and also used against rose black spot. It is obtainable as a wettable powder and is applied as a spray.

THRIPS A general name given to a number of related insects which attack a variety of plants, both outdoors and under glass. They suck the sap from the leaves, stems and flowers, causing these to become distorted and to develop brown, silver, or white streaks and spots. Thrips are small, active and long in proportion to their width. They vary in colour from pale yellow to black. Flower buds that are badly attacked may turn brown and refuse to open. If the presence of thrips is suspected in flowers or buds, one of these should be tapped smartly over a sheet of white paper when many of the insects will fall out. Thrips are always most abundant in hot, dry weather. In consequence the first line of defence under glass is to give plenty of ventilation, and syringe foliage and damp down paths and stages frequently to maintain a damp atmosphere. Thrips may be destroyed under glass by fumigating with naphthalene

or nicotine or by spraying with HETP. Outdoors spraying with HETP or nicotine are the most effective remedies.

THYRSE A botanical term used for a particular type of flower cluster which may be described as a compact and rather narrow panicle (*q.v.*)

TIFFANY A form of muslin with a gauze-like texture, which is frequently used for shading plants in greenhouses. It is too fine a material to withstand wind and rain, and consequently cannot be used satisfactorily in the form of blinds outside the greenhouse but it can be pinned to the rafters inside the house, used in the form of blinds under the rafters, or laid on some temporary support over the plants. Tiffany is valuable because it breaks the heat of strong sunshine without shading the plants too heavily.

TILL The cultivation of soil by ploughing, digging, forking or any other method. The various operations of tillage are dealt with under their respective headings.

TILTH The crumbly soil texture produced by good tillage. Thus, when it is stated that a seed bed should have a good tilth, the meaning is that the surface soil should be broken down finely and should be in such a physical condition that it can be moved easily with rake or hoe. The provision of a good tilth is one of the most important objects of cultivation, particularly where crops are to be raised from seed or from small plants. Good tilth depends not only upon the way in which cultivation is carried out, but also upon the condition of the soil when this work is done. After winter digging, rough lumps of soil are most likely to break down to a fine tilth if they are forked after frost, but when the surface of the soil is fairly dry. The addition to the soil of bulky organic materials such as leaf mould, peat and decayed manure also helps to produce a good tilth. On heavy clay soils tilth may be improved by adequate liming. (*See Flocculation.*)

TINE A name given to each individual prong of such tools as forks and cultivators.

TOMENTOSE Covered with a close mat of hairs; a botanical term used in the description of leaves and stems which have a covering of this type. The covering itself is sometimes referred to as a 'tomentum'.

TOP-DRESSING A term used by gardeners to describe the application of some substance to the surface of the soil, in distinction to working something into the soil. Top-dressings may consist of bulky substances such as dung or compost, though with these the process is more frequently referred to as mulching. More usually top-dressings consist of artificial fertilizer, lime or some other fairly concentrated substance. Top-dressings provide a convenient method of feeding plants while in growth. When soluble chemical fertilizers such as sulphate of ammonia, nitrate of soda, superphosphate of lime and sulphate of potash are applied, it is important not to exceed quantities recommended by experts, as, if this precaution is not taken there may be too great a concentration of the chemical in the surface soil, with consequent injury to roots. It is also frequently important to keep top-dressings to the soil only and not spread them over stems and leaves. Superphosphate of lime and sulphate of ammonia can both be very damaging to foliage and so can fresh soot. It is sometimes recommended that top-dressings of fertilizers should be mixed with the surface soil by hoeing. This seems a matter to be dictated by tidiness rather than by utility.

TOPIARY The art of clipping and training shrubs and trees to form intricate patterns or forms such as balls, cones, pyramids, peacocks and bears. The art was at its height in this country during the seventeenth century and has declined during those periods in which the fashion has been for informal rather than formal gardening. Nevertheless there are many magnificent specimens in the country.

Yew and box are the two favourite plants of the topiary artist, though bay is also favoured and many other shrubs, including holly, privet, and *Lonicera nitida* may be used. The shaping of the shrub is done partly with shears or secateurs and partly

by tying young shoots to a wire frame shaped to the rough outline of the specimen. The frame remains as a permanent part of the specimen, but is eventually completely concealed by its growth. Frames are more necessary for the complex shapes than for those of comparatively simple outline. It is very desirable, though not absolutely essential, that the formation of the topiary specimen should be started while plants are still quite young. It may be necessary to tie and clip such specimens five or six times a year between early May and the end of September.



Topiary work

TOPPING A term which may be regarded as almost identical with stopping as it implies the removal of the growing point of a plant. If any distinction is to be made it may be on the grounds that whereas the purpose of stopping is usually to make plants produce side growths, that of topping is done for some other purpose. For example, in the case of broad beans the purpose of topping is to remove the soft growth which is most likely to attract black fly (aphis), a common pest of the broad bean in late spring and early summer.

TOXIC A word that is synonymous with poisonous.

TRACE ELEMENT The name given to certain elements which are required by plants in very minute quantities. Among the principal trace elements are iron, manganese, boron, copper and zinc.

TRAINING The art of inducing a plant to conform to a particular shape or form which for one reason or another is desirable from the gardener's point of view. Thus trained fruit trees may be useful to plant against walls where the growth is to be confined to one plane only, or to produce trees of small dimensions as in the single-stemmed tree or cordon. Climbing plants are usually trained in some way. Occasionally climbing roses are grafted on the top of strong brier stems 5 to 7 feet in height and are then trained downwards over umbrella-like wire frames to form specimens which are known as weeping standards.

With some plants training is merely a matter of tying growths to supports placed in convenient positions, but more often it involves some measure of pruning, including the removal of badly placed or superfluous shoots and the retention of those which can be trained most readily to the desired form. Pruning may also be used to induce growths to form in the right places. For example, in the formation of horizontally-trained fruit trees, the central vertical shoot is cut back each year to a point a little above that at which the next pair of horizontal arms is required. Strong new shoots are generally produced just below the point of pruning and in this instance three of these shoots are retained, one being trained vertically and the other two bent down to left and right respectively to form the next pair of arms. In the same way pruning may be used to produce strong shoots in any part of a tree or shrub as required.

Growth can also be induced by notching, i.e. by the removal of a small triangle or crescent of bark just above a dormant growth bud. If this is done as growth starts in the spring, the result will often be that the bud immediately below the notch will start into growth. This technique can often

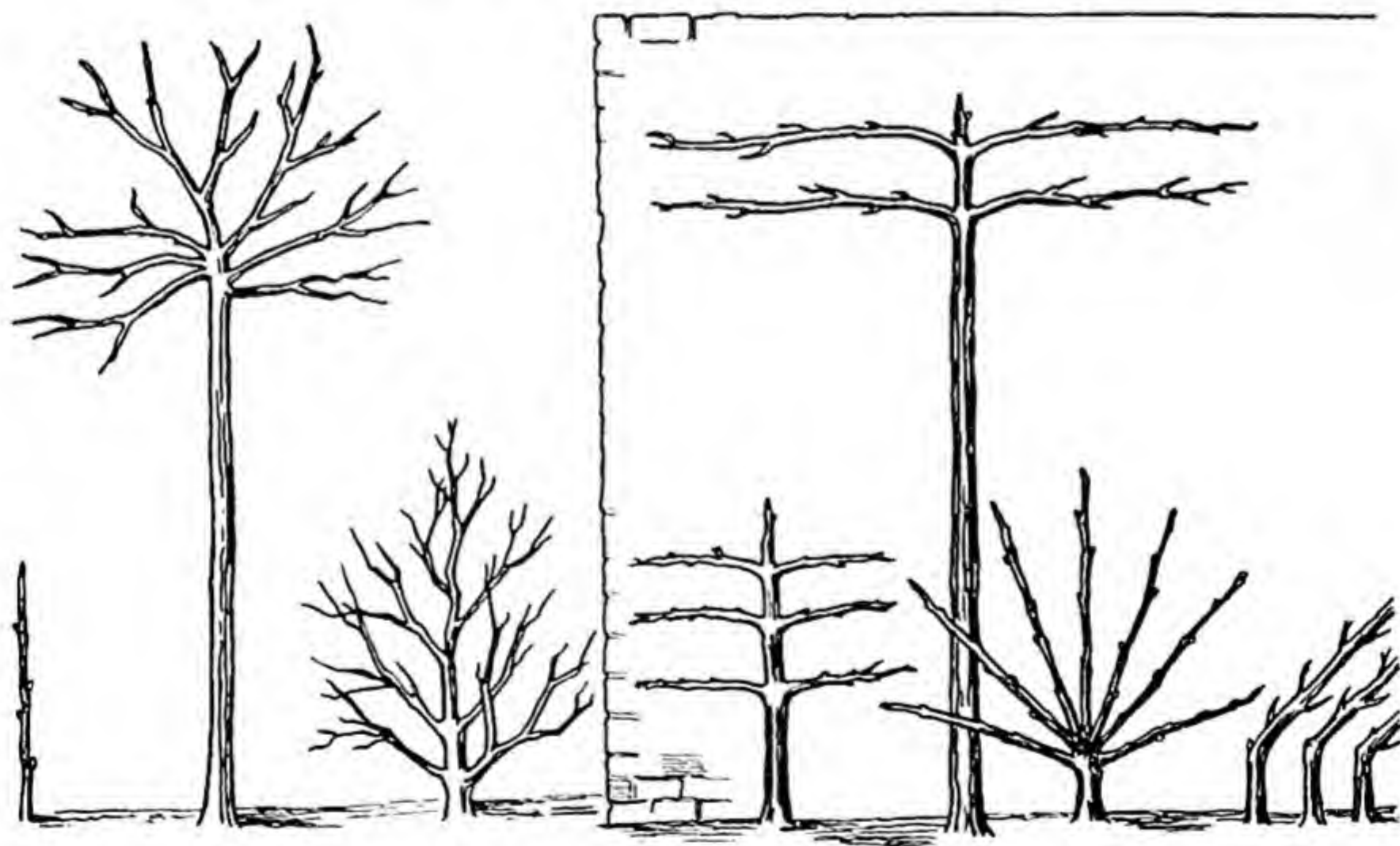
be used with advantage to fill in bare spaces of trained specimens. Where for one reason or another it is not practicable to notch, it is sometimes possible to graft a young shoot in the bare place and subsequently prune and train it to fill the position.

TRANSPLANT This may be considered but a synonym of planting, a subject dealt with under that heading. Alternatively transplanting may be regarded as having particular application to the removal of plants from one place to another with the express purpose of either giving them more space to develop or checking their root growth. This kind of transplanting is common in the nursery garden where trees and shrubs are usually transplanted annually for both the purposes mentioned. The importance in this case of keeping roots in check is that, when the plant is eventually sold, it can be lifted with a compact ball of roots, as a result of which it will not suffer as much check as would an untransplanted one which had sent out its roots unchecked in all directions. Young seedling plants of wallflowers, brassicas, etc., are often trans-

planted from the seed bed to a nursery bed with the same object. The precautions to be observed in the methods adopted are in all instances those discussed under the heading *Planting*.

TRAYS Shallow boxes used for storing bulbs, potatoes, fruits, etc. The term 'seed trays' is also applied to shallow boxes used for the germination of seeds or the pricking out of seedlings. Trays for storage are frequently made with a wooden upright at each corner, projecting a couple of inches above the rim of the tray, the object being to enable one tray to be placed on top of another without pressing on whatever may be in it. As a result, air can circulate freely between the trays, and light can also penetrate. Such trays are particularly useful for sprouting potato planting sets. Seed trays may be of any convenient size. Measurements which are commonly adopted by manufacturers of seed trays are $14\frac{1}{2}$ inches by 8 inches by $3\frac{1}{2}$ inches.

Seed trays will last much longer if treated with a suitable wood preservative but creosote should not be used because



Training fruit trees. From left to right: cordon, standard, pyramid, horizontal, standard horizontal, fan, oblique cordon

fumes from it can be deadly to plants. Copper naphthenate is harmless to plants and a better preservative than creosote.

TREADING Few plants can make satisfactory root systems in loose soil and in consequence it is usually advised that seed beds should be either rolled or trodden to make the soil firm. Similarly when plants are moved from one place to another the soil should be pressed firmly round the roots. With small plants this can be done adequately with the knuckles or with the handle of a trowel, but with large plants such as shrubs and trees it is necessary to tread the soil firmly round the roots. Where treading is to be carried out it is essential that the soil be in suitable condition, neither so wet that it sticks to the boots, nor so dry that it is impossible to consolidate it by treading.

The term 'tread' is also applied to that part of a spade or fork on which the foot is placed to drive it into the soil.



Treading a seed bed

TREE Any woody plant with a distinct trunk or main stem. The term may be used in distinction to shrub or bush, terms which are used for woody plants which begin to branch at or near soil level and consequently have no distinct main trunk.

TREE BANDING Another name for grease banding (*q.v.*)

TREE GUARD Any device for protect-

ing trees from the attacks of rabbits, cattle, etc. Tree guards are often made of metal in the form of a number of upright bars curving outwards at the top and attached to two or three encircling bands which hold them in position round the trunk of the tree. Sometimes guards are made of wood, many patterns being adopted according to the type of material being used and the size of the tree to be protected. Wire netting may also be employed, but if this is done care should be taken to see that it is strong enough to withstand the rubbing of cattle and that it is firmly fixed to suitable uprights well buried in the soil. Occasionally bundles of twigs are used as a temporary protection. They should be placed vertically all round the trunk and then be tied securely in position. If a sufficiently thick layer of twigs or small branches is used in this way even small creatures such as rabbits will be unable to damage the trunks.

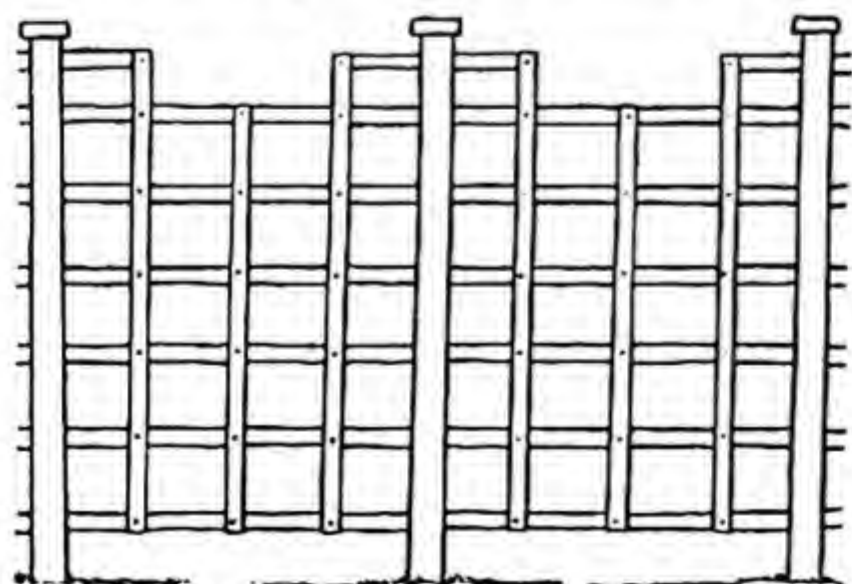
TREE PRUNERS Sometimes known as 'long-handled pruners', these are tools designed to enable the gardener to remove shoots or small branches from trees without climbing up into them. The commonest pattern has a pruning head of parrot-bill type, attached to a long wooden or hollow metal shaft, with a lever near the base by which the pruning blade can be operated. The length of this lever enables considerable force to be applied to the blade and in consequence such tools can be used to sever branches up to about half an inch in thickness. They can be used for the thinning of fruit trees, but should not be employed for spur pruning or other work involving considerable accuracy in cutting.

TREE SURGERY A term somewhat loosely used to cover the pruning of trees and the treatment of any wounds that may be caused during this work or which may develop through accident or the attacks of insects or fungi. Pruning is dealt with under that heading.

The treatment of pruning wounds is only likely to be necessary for fairly large wounds caused in the removal of large limbs. These may be coated with some

dressing to prevent attack by fungi or other disease-causing organisms. It should be observed, however, that there are few, if any, wound dressings which do not actually delay the natural process of wound healing, so that their use cannot be considered wholly an advantage. One of the most satisfactory substances to use is grafting wax, warmed until it is sufficiently thin to be applied with a stiff paint brush. Stockholm tar is often recommended and has antiseptic qualities. There are also numerous proprietary dressings on the market. Wounds caused by the breaking of branches, or superficial wounds caused by insects, disease, etc., may be treated in the same way, but first the exposed surface should be pared down with a sharp knife so that a clean wound is made. Deep cracks or holes may need to be filled, and for this purpose concrete, made with 3 parts of builder's sand and 1 part of cement, is generally used.

TRELLIS Any erection made by fastening light wooden bars or laths together to form a cross-work pattern. This may take the form of plain square trellis, diamond pattern trellis or some more complex pattern for particular ornamental purposes. Trellis work may be used as a support for climbing plants, to form a screen or barrier between one part of the garden and another, or to raise the height of existing fences or walls. Trellis work is also hung on walls as a support for climbing plants and is particularly useful for this purpose as it obviates the necessity for driving nails into the wall at frequent points. Trellis is usually



One form of trellis work

made of deal treated with a wood preservative such as creosote or copper naphthenate. If it is required to last for many years, it should be made of teak or oak.

TRENCH It is sometimes advised that certain crops should be grown in trenches and this is the method occasionally recommended for sweet peas, runner beans, leeks



Trenching

and celery. The method will vary a little according to the crop to be grown. In general the idea is to cultivate, to a depth of 2 or 3 feet, a strip of soil no more than 1 to 2 feet in width. The soil is first removed from this narrow strip to the desired depth and then it is replaced a little at a time, manure or compost being liberally added meanwhile. The method has the merit of concentrating plant food where it will convey the maximum benefit, but it suffers from the drawback that the water tends to collect in the comparatively loose soil replaced in the trench, become stagnant and cause injury to roots. There is a good deal to be said in favour of trench cultivation on suitable soils, but it is open to criticism on heavy and wet soils.

The term 'trench' or 'trenching' is also used for a particular form of deep digging in which the soil is broken up to a depth of $2\frac{1}{2}$ to 3 feet. It is described under *Digging*.

TRIPLOID A plant with 50 per cent more chromosomes than is normal for the species to which it belongs. See *Polyloid*.

TROWEL Small planting tools are made in two styles, one with a handle up to 15 inches in length, the other with a short handle 4 to 6 inches long. The latter is by far the more serviceable type and though it may seem to involve more stooping, will in practice be found far less tiring to use. Trowels are made of steel, including stainless, or of aluminium alloy, the latter having the advantage of being non-rusting and light, though they are not as strong and durable as steel trowels. A trowel should be used for the planting of all seedlings and small plants that are too big on the one hand to be transplanted with a small dibber, and too small on the other hand to be planted with a spade. It is to be preferred to the large dibber for almost all purposes with the possible exception of planting brassicas, the reason being that the large dibber tends to consolidate the soil unevenly and also to make too narrow and deep a hole in which roots are unnaturally cramped and which are not properly refilled so that the plant remains suspended with a hole beneath it in which water later collects. With the trowel a suitably wide and shallow hole can be scooped out to accommodate roots in a natural position and firming can be done according to the needs of the plants.

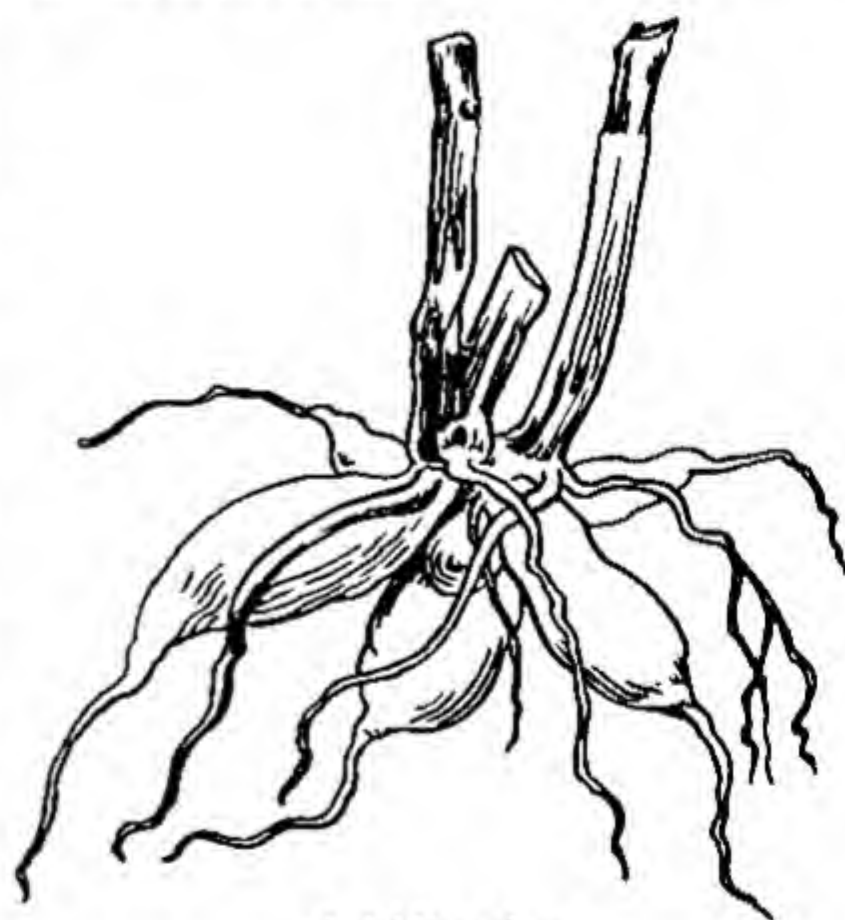
TRUE BREEDING A plant is said to be true breeding when its flowers, having been fertilized with their own pollen, produce seed which will give seedlings with all the essential characters of the parent. Thus with a variety of sweet pea, it can only be regarded as true breeding if the seed saved from it after self-fertilization will produce plants bearing flowers of the same character and colour as those of the parent. It is important to observe that the term is relative and not absolute. No plant reproduces itself true in every minute detail. It is a question of what is important from the gardener's standpoint. The geneticist describes a true-breeding plant as homozygous, and one that is not true breeding as heterozygous or hybrid.

TRUG, see *Sussex Trug*.

TRUNCATE Cut off abruptly at the end; a botanical term applied to parts of plants which terminate in this manner.

TRUSS A rather loose term for a cluster of flowers or fruits. Thus one may speak of a truss of tomatoes but not a truss of grapes. Perhaps more strictly the term should be confined to compact clusters of flowers produced at the ends of stems, as in many species of primula or rhododendron.

TUBER A thickened underground stem or thickened root used for the storage of food, often in the form of starch. Familiar examples are the potato, a stem tuber, and the dahlia, a root tuber. The tuberous begonia may be contrasted with the crocus which has a corm which resembles it in some particulars, but is covered by a membranous coat. The difference between root and stem tubers can be determined by whether or not they produce eyes or buds. The stem tuber always has eyes, whereas the root tuber has not.



A dahlia tuber

TUFA A name given to a particular type of limestone, frequently of a very porous texture. A particular type of hard tufa, found near Matlock in Derbyshire, has been used both for rock gardens and for miniature gardens in bowls, old sinks, etc. Because of its porous nature it absorbs

water freely and attracts roots. It quickly weathers and becomes covered with mosses, lichens and other pleasing growths.

TULIP FIRE, see *Fire*.

TUNICATED A botanical term used to describe bulbs, such as the onion and narcissus, in which the scales are concentric, each being wrapped round that immediately beneath it.

TURF A term which may be applied to a surface covering of grass, clover or some other meadow-forming plant, or to the complete surface layer of 2 or 3 inches, comprising both the covering herbage and the roots which it produces. Thus 'turfy loam' may mean the first 3 or 4 inches of grass and soil cut from a meadow or similar place, and turves for lawn making are usually cut with about 2 inches thickness of soil. Good turf may be of natural formation or be produced by sowing seeds for the express purpose of producing a suitable herbage. For lawn-making, natural turf,

especially when cut from a site near to or of similar character to that on which the lawn is to be formed, has the merit that the grasses are likely to be of a character suitable for the soil and climate; but it suffers from the drawback that it is seldom free from weeds, including undesirable grasses.



Levelling turf

Weeds can usually be dealt with by cutting them out of the turves or by treating the lawn with a suitable weedkiller but undesirable species of grass are a much more difficult problem and can seldom be eradicated without injuring the useful species as well. The subject of lawn-making both from seeds and from turves is dealt with under the heading *Lawns*.

Turves for the preparation of potting compost should be stacked, grass-side downwards, for a period of at least twelve months before use, so that the grass and some of the roots may rot. The stacks can be of any convenient size.

For compost-making it is desirable that turves should be cut from a fairly rich meadow, one for example in which a considerable number of cattle have been allowed to graze. This kind of turf is seldom the most satisfactory for lawn-making as it is apt to contain many coarse grasses, clovers, and weeds.

TURF BEATER A special tool, sometimes known as a turf beetle, which is used for settling turves that have been laid to form a lawn. Beaters are of various pat-



Rolling turves

terns, one of the most useful types being in the form of a smooth block of wood, 10 to 12 inches in length and 4 to 6 inches in width and depth, with one flat face and a shaped handle at one end. An alternative type has a handle 4 to 5 feet in length fixed at an angle on a flat block of wood, roughly 15 inches by 12 inches by 2 inches, the whole tool looking rather like a long-handled floor polisher without a hinge.

TURF PERFORATOR Tools of many different patterns are used to perforate turf which has become too consolidated by heavy wear and is consequently in need of aeration. An ordinary hand fork may be



A spiked roller for the lawn

used for the purpose, pushed in at frequent intervals all over the surface of the turf to a depth of 2 to 3 inches. (See also *Roller*.)

TURF RACES Tools used for marking out turf before it is lifted for lawn making or for stacking. The usual type of race, or racer, has a long ash handle slightly curved at the base, with a sharp knife fastened

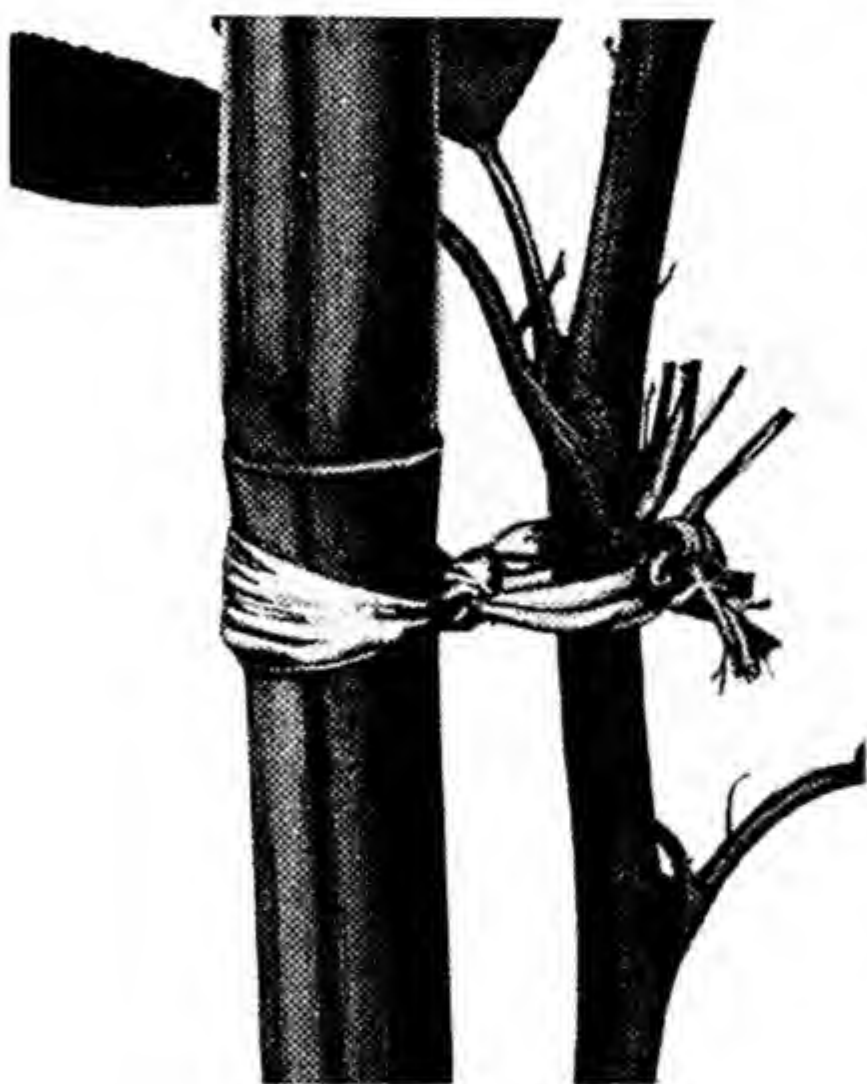
almost at right-angles near the bottom. The cutting edge of the knife is in reverse, so that if the tool is drawn towards the operator the knife will cut through the turf. More elaborate tools are made, some fitted with wheels and other devices to regulate the depth of cut.

2:4D An abbreviation often applied to a chemical used as a plant hormone for killing weeds. (See *DCPA*.)

2:4:5-T The style given to a selective weedkiller the full chemical name of which is 2:4:5-trichlorophenoxyacetate. Trade formulations of this are prepared for use on lawns and will kill some weeds which have proved resistant to other chemicals. Other preparations of the 2:4:5-T are used to kill brushwood and to kill weeds in hedge-bottoms, also water weeds. In all cases manufacturer's instructions must be followed as there is no standard formulation.

TYING The tying of plants for support is included under the heading, *Staking*. Here it may be observed that choice of material for tying should be governed by the type of growth to be supported, the ultimate strain which the tie is likely to bear, and the length of time that it will be required to last. Thus, for all those plants with soft or succulent growth, ties of very pliable material should be used, such as soft raffia, twist, fillis or twine, tarred or plain. Galvanized wire rings are often used for firm growths such as those of carnations, but should always be sufficiently loose to allow for expansion of growth. Ties of raffia, thin twist or fillis cannot be expected to last more than one year and often begin to deteriorate after a few months. This is sometimes an advantage, as with ties used for buds or grafts when budding and grafting. With these the tie has usually completed its purpose within five or six weeks, after which it is an advantage if it breaks easily so that the bark of the grafted plant may swell. Ties that are expected to remain for two or three years can be made of tarred twine, galvanized wire, or some other durable material.

It is often an advantage when tying plants, particularly those that are of soft growth which is likely to increase in girth rapidly, to make a double twist in the tying material between the stem and the stake or other support. This twist acts like a spring, allowing a reasonable degree of expansion, and yet holding the stem firm even when the tie is first placed in position.



Tying

TYPE Botanically this term is used for that particular form of a species which has been described for the purpose of classification. Variations from this form, which are nevertheless not sufficiently distinct to justify classification as separate species, may be referred to as varieties or forms of the species and be given distinguishing names additional to the species name. It should be observed that it does not follow that the type form is the commonest form in nature, but merely that it is the first form to be described fully for the purpose of botanical classification. Thus, with *Lilium Brownii*, which was originally described in 1841 from plants which were descended from the bulbs introduced in England about 1835, no one seems to be quite clear as to the origin of the original bulbs, and no

further plants of precisely this character have been found in the native habitat of *Lilium Brownii*. At least two variants of the original *Lilium Brownii* have since been introduced to cultivation, and these carry the distinguishing names of *Lilium Brownii* var, *viridulum*, and *Lilium Brownii* var, *australe*. The type may itself be distinguished, if desired, by a third name, though it is seldom used for any but botanical purposes. In the example chosen, the type plant may be distinguished as *Lilium Brownii* var. *Brownii*.

In gardens the term 'type plant' is often used more loosely to distinguish the form commonly grown in gardens from other forms of the same plant of more unusual character.

UMBEL A botanical term used to describe flower clusters in which the flower stalks or branches all arise from a common point at the top of the main flower stem. The flower head of a carrot is of this form.



An umbel

UNDULATE With wavy margins; a botanical term applied to leaves, etc. which are of this character.

UNISEXUAL Of one sex only. The term is used by botanists for flowers which produce stamens but no pistils, or pistils but no stamens. This is the opposite of hermaphrodite. The begonia provides a familiar example of a plant with unisexual flowers.

VARIEGATED Of two or more colours. As a rule the term is applied only to foliage and stems, but it may occasionally be used in connexion with flowers that are blotched or marked with more than one colour. The commonest type of foliage variegation is due to lack of chlorophyll or green colouring matter in some parts. As a result patches of yellow or white appear and these may either be regularly disposed in bands or along the veins, or they may be irregularly disposed in spots or blotches all over the surface of the leaf. Variegation is often a symptom of virus infection, and diseases known as mosaic show this symptom in a marked manner. Variegation can also be an inherited characteristic unconnected with any pathological condition. Usually in such cases the variegation occurs as a chimaera, i.e. tissues of two or more kinds occur, one often overlying the other like a glove (see *Chimaera*).

Variegated plants are often of great decorative merit. As a rule they can only be propagated true to type by vegetative means, i.e. by cuttings, grafts, or layers. They are generally a little weaker in growth than their normal green counterparts, this being due to the lack of chlorophyll which is essential to the process of photosynthesis by which the plant manufactures its food-stuffs with the aid of energy obtained from sunlight.

VARIETY A division used in the classification of plants (see *Classification*).

VEGETABLE The term is used in two different ways, one scientific and the other horticultural. From a scientific standpoint a vegetable is any living organism that is not an animal. In the higher levels of life this is a distinction easily understood, as animals have the power of movement, often have a fairly highly developed ner-

vous system, and live by breaking down complex organic substances. Vegetables, by contrast, are relatively motionless, have no obvious nervous system and build up their food from simple, inorganic compounds. In the lowest levels of life the distinction fades into obscurity and it becomes almost impossible to decide whether an organism is in fact, vegetable or animal.

Horticulturally a vegetable is an edible plant that is used primarily as a salad or as a complement to or in place of a meat course, in distinction to a fruit, which is used primarily for dessert. Thus at flower shows there are usually classes for vegetables and fruits and there is occasionally dispute whether certain things, tomatoes for example, should be shown in the one section or the other. To get this matter in clear perspective it must first be realized that the one term implies the other, i.e. a fruit is a part of a vegetable and is, therefore, vegetable in character. Botanically a tomato is a fruit but horticulturally it is shown in vegetable, and not in fruit classes, as a tomato is most frequently used in the manner defined for a garden vegetable. By a similar process of reasoning, rhubarb, which botanically is not a fruit at all, is sometimes included in the fruit section of a show because it is commonly used for dessert and not in the manner usually associated with garden vegetables.

VEGETATIVE PROPAGATION Any method of increasing a plant other than from seeds. Thus the term may include division in all its forms, taking of cuttings or the preparation of layers, grafts, buds, etc. An advantage of such methods of propagation over seed (seminal) propagation is that, as a rule, a plant produced in this way resembles its parent in every minute particular, whereas plants raised from seed always differ in some measure from their parents, though the difference may be so minute as to be unimportant. Nevertheless many hybrid varieties will not breed anything like true to character from seed, but will show variations which will be serious from the standpoint of garden display. Most hybrid plants can only be repro-

duced true to type by vegetative propagation. All the plants vegetatively reproduced from one original parent constitute a clone and such groups of plants are sometimes designated by the letters, cl. before or after their names to indicate their common origin.

VENATION The arrangement or pattern of the veins in a leaf.

VENTILATION Some circulation of air is necessary for most plants grown under glass, partly because without it temperatures will rise too high during sunny weather, partly because the moving air will help to keep the atmosphere from becoming too damp and partly to supply plants with oxygen and carbon dioxide. It seems probable that the rate of change necessary to supply this last need is usually fulfilled by the cracks and crevices which occur even in well-made glasshouses. Evidence of this may be found in the fact that even when, due to cold weather, ventilators and doors have to be kept shut for weeks on end plants do not appear to suffer any ill effects of lack of oxygen.

The degree of ventilation required for satisfactory growth will vary according to time of year, the temperature outdoors, the amount of wind and its direction, the amount of sunlight, the position of the glasshouse or frame and the character of the plants to be grown. In consequence no general advice on this matter can be given except to remark that draughts should be avoided and that the change of air should take place as smoothly as possible without sharp currents occurring anywhere.

Glasshouses should have ventilators both at the ridge and at the sides, and in glasshouses provided with staging it is often an advantage to have some small ventilators in the walls below the level of the stages. In span-roofed or three-quarter span-roofed glasshouses, ventilators should be on both sides of the ridge so that, when desired, air can be admitted only on the leeward side. This is essential in order to avoid sharp draughts and foliage scorching resulting therefrom. Top ventilation by itself can often be used with advantage to dry the

atmosphere of a house which is too damp, without causing too great a drop in temperature. By contrast in hot, sunny weather, both side and top ventilators should be used in conjunction, so that a steady flow of air occurs between them. Though very slight ventilation may be adequate much of the time, all glasshouses should be provided with sufficient ventilation space to allow a rapid exchange of air if necessary. Many small glasshouses fail in this respect. As a general rule the length of ridge ventilators in a span-roofed glasshouse should at least equal the whole length of the house, and the ideal for this type of house is that the total length of top ventilators should be double the length of the house, i.e. they should extend the full length of the house on each side of the ridge. Side ventilation in houses with vertical glass sides need not be on quite such a generous scale, but there should not be less than one 2 ft. \times 3 ft. ventilator every 10 feet. or the equivalent of this.



Ventilating frames

All plants that are reared under glass but are to be placed outdoors later on should have steadily increasing ventilation as the time for removal outdoors approaches. It is for this reason that frames are so valuable for hardening off plants during the last few weeks, as in a frame the light can be entirely removed when weather conditions are favourable, and the plants within fully exposed to the air. Even the best-ventilated greenhouse cannot give conditions comparable with this.

A modern development in ventilation is the provision of mechanism, usually electrically driven and controlled by a thermo-

stat or time switch, to open and close ventilators automatically. Such apparatus can be a great boon to amateurs who have to be away from home most of the day, but unfortunately it is rather expensive and in consequence it has not as yet been widely adopted.

VERGE The edge of a lawn where it joins a path, bed or border. The term is also sometimes applied to a narrow strip of grass bordering a path, or bed, but the former meaning is more accurate.

VERMICULITE A natural substance, allied to mica, which, when subjected to intense heat, expands and forms granules that are full of air spaces. It is then extremely light in proportion to its bulk and very absorbent. Its principal use is in building, but it is also used in gardens, either by itself or in combination with sand or peat, as a medium in which to root cuttings or germinate seeds. For either purpose it is essential to obtain vermiculite that is not strongly alkaline. It has the merits of holding water without becoming waterlogged, of being entirely sterile, and of being so light that seedlings or rooted cuttings can be lifted from it without breaking even their finest roots. Its drawbacks are that it is rather expensive and completely devoid of plant food, so that plants left in it for long will starve. It is obtainable in various degrees of coarseness.

VERNALIZATION This name is given to various techniques by which seeds or plants can be made to pass through, at a greater rate than normal or at an unusual season of the year, those physical and chemical changes which would normally occur in winter. By this means seeds or plants may be brought into a condition in which they will start into growth rapidly directly they are subjected to sufficient light and warmth and given sufficient moisture. Techniques of this kind have been much used in the preparation of bulbs, such as narcissi, tulips, and hyacinths, for forcing. For this purpose the bulbs, when lifted in summer after having completed their normal growth, are placed in refrigerators

at carefully controlled temperatures which will vary according to the nature of the plant under treatment. After remaining an appropriate number of weeks in these conditions, the bulbs are removed and stored normally. When potted or boxed and placed in a greenhouse with a suitable temperature, they grow very rapidly and produce flowers during the winter months.

VINE SCISSORS Scissors with narrow pointed blades, not unlike those used by



Vine scissors

barbers, employed for the purpose of thinning the berries in young bunches of grapes. They are stocked by most dealers in horticultural sundries.

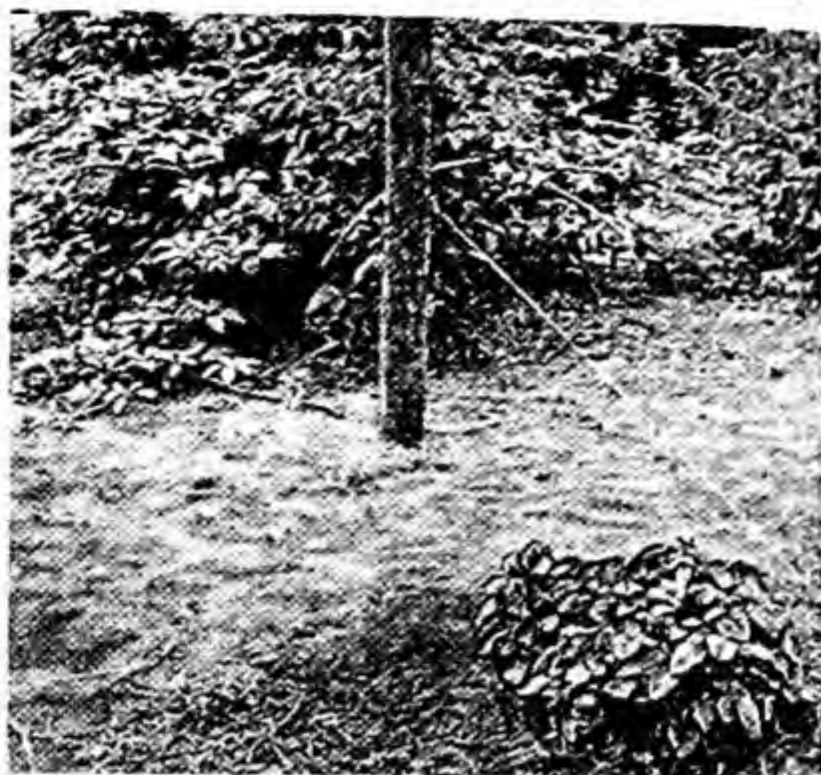
VIRUS A general name given to a great variety of disease-causing organisms which differ from fungi and bacteria in being far

smaller, and in having a less clearly defined life cycle. There is, indeed, considerable difference of opinion as to whether viruses are to be regarded as living organisms or merely as organic chemicals. They exist in the sap of the plant attacked and are carried from one part of the plant to another in the sap. In consequence, exterior application of sprays, dusts or fumigants is ineffective. So far, no satisfactory method has been discovered of curing virus diseases.

The symptoms caused by viruses are very varied. They may produce yellow or white variegation of leaves, and symptoms in this category are often referred to as mosaic diseases. Alternatively they may produce distortion of the young shoots of the plant, curling of the leaves, dwarfing of the whole plant, streaking, or small dry brown spots. The damage caused by viruses is often wrongly ascribed to weather or soil conditions.

Viruses are spread from one plant to another by transference of sap. The agents may be sucking insects, such as greenflies or thrips, or the sap may be carried on the blades of pruning tools or on the fingers of those working amongst the plants. One particularly troublesome virus which attacks tobacco as well as many other plants, is often introduced to the garden on the fingers of smokers.

Methods of control include the rigorous removal and destruction of all plants that show virus symptoms, spraying, dusting, or fumigation to kill sucking insects, the disinfection of pruning tools by dipping them occasionally in strong lysol solution, and the production of virus-free plants in special nurseries or in districts in which virus infection is small. One of the advantages of purchasing seed potatoes from certain districts in Scotland and Ireland is that in these localities sucking insects seldom appear at all freely until late in the summer. In consequence seed potatoes from these areas are usually virus-free. When these tubers are planted in more southerly districts where potato viruses are common, they will usually give a good crop the first season, as even if virus infection occurs, it will not seriously affect growth



Blackberry dwarfing virus

the first year. It is a characteristic of many viruses that they weaken plants slowly and progressively over a period of years but do not kill them rapidly.



Two strawberry plants affected by virus, contrasted with a healthy plant at the back

VISTA A view which is confined on either side by trees, hills or other objects. In gardens vistas are often carefully contrived by planting trees or hedges to confine the view and direct attention in a partic-

ular direction. An appearance of great depth can often be given to a comparatively small garden by a cleverly contrived vista.

VITICULTURE The art of growing grape vines.

VIVIPAROUS Producing living young. A term which strictly applies to the animal rather than the vegetable kingdom, but is used occasionally by botanists and gardeners for those plants that produce small bulbs or offsets that begin to grow while still attached to the parent. Such plants are said to be viviparous. A familiar example is *Polystichum aculeatum angulare* which usually produces young plantlets along the mid-ribs of its mature fronds.

WALL Garden walls may be used for protection, to divide one part of the garden from another, or to retain soil that has been terraced. For the first purpose brickwork or stonework is almost always laid with cement to bind it together. Small dividing walls and also terrace walls are often made of loose stone and are known as dry walls in contradistinction to cement or mortar walls. One of the merits of the dry wall is that it can be used as a home for many small plants, including alpines. These can be established successfully even in narrow crevices between the bricks or stones, and the plants often derive great benefit from the sharp drainage which they enjoy in such places.

No matter what system of building is adopted the bricks or stones should always be laid with some kind of bond, i.e. the bricks or stones in successive layers should be staggered so that they tie each other together. Dry walls are often built with a slight batter or backward slope as this gives them greater stability. When building dry walls, soil should be spread between each course of brick or stone and should also be rammed into crevices behind the bricks or stones. In this type of construction soil takes the place of cement and must be used to give every brick or stone a firm bed.

For high terrace walls which must hold



Building a dry wall

back a considerable weight of soil dry wall construction is not, as a rule, satisfactory. Not only should the stones or bricks be set in cement but buttresses should be built every 15 or 20 feet to give further support to the masonry. Walls for fruit trees should be at least 7 feet and preferably 10 or 12 feet in height. Low walls are not of much service for this purpose as the trees quickly grow above them and then part of the growth is protected and part exposed, which is not a happy combination.

For many choice fruit trees and climbing plants, walls facing south or west are most satisfactory but it is also possible to clothe walls facing east or north. In particular many of the hardier plums will succeed in such places and so will the Morello cherry. Many slightly tender shrubs succeed better on walls facing north-west than they do in a southerly aspect, apparently owing to the fact that on south-facing walls they are often encouraged to make premature growth in early spring and this tender young growth is cut by late spring frost.

If plants are to be grown in a wall, it is a great advantage if they can be planted as the work of construction proceeds. It is possible to plant afterwards by scraping out soil from some of the crevices, pushing the roots of the plants carefully into the fissures made in this way, and then pressing more soil around them, but this is a laborious task compared with the comparative simplicity of planting as one builds.

WALL NAIL Special nails with flexible metal attachments at the head used for fastening plants to walls. The nail itself is designed to be driven into the mortar or concrete between a course of brick or stone, and the flexible metal head can then be twisted round the shoot to be supported.



Wall nails

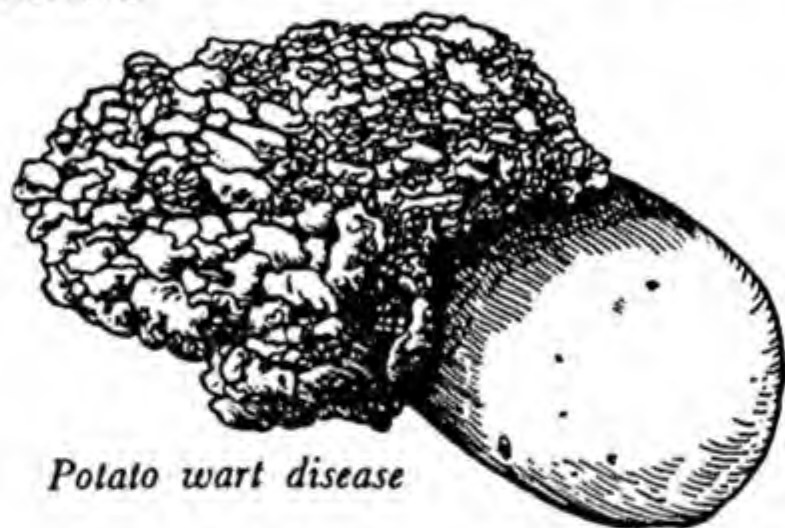
WARDIAN CASE A glass case with a close-fitting lid, used for the cultivation of certain rather difficult ferns and other greenhouse plants. The wardian case is virtually a close frame in which the atmosphere can be kept very still and, if necessary, very damp. Since the case has glass sides the plants within can be seen readily and at one time wardian cases were frequently used as objects of interest or ornament within the dwelling house, where they might be filled with filmy ferns or similar plants. The case was designed by Nathaniel Bankshaw Ward, 1791-1868.

WART DISEASE A fungal disease which is peculiar to potatoes. First symptom is the appearance of wart-like outgrowths on the young tubers. As the attack progresses the tubers may be almost completely destroyed, little being left but a small gnarled lump

bearing little resemblance to a potato. Occasionally only part of a tuber will be attacked, the rest continuing to grow normally.

This is a notifiable disease and no treatment should be attempted without guidance from the Ministry of Agriculture and Fisheries. The Ministry must be informed immediately an attack is observed.

Some varieties of potato are immune to wart disease and these can be grown on infected land without danger that they will contract the disease. Such varieties are indicated in catalogues by the word 'immune', but it should be noted that in this connexion, the word only implies immunity to wart disease and not to other diseases.



Potato wart disease

WASHING SODA Common washing soda as used in the kitchen makes a useful fungicide either by itself or in combination with copper sulphate as in the formulation known as Burgundy mixture. As a fungicide on its own, 12 ounces of washing soda and 8 ounces of soft soap are dissolved in 5 gallons of water. Dissolve the soft soap in a gallon of water, dissolve the washing soda in another gallon and then mix the two solutions together. Make up the solution to 5 gallons, stir well and use at once. This spray is particularly useful to prevent the spread of gooseberry mildew.

WASPS These insects can be very troublesome to the fruit grower. Nests are made in hedge banks, under eaves, etc. and should be found and destroyed either by placing calcium cyanide in them or by scattering DDT at the entrance. Alternatively they can be soaked in paraffin and burned. Individual fruits can be protected with paper or muslin bags.

WATER GARDEN In a narrow sense the term may be confined to lakes, pools and streams in which plants are cultivated, but it is usually extended to include also planted bogs and damp ground surrounding such places. Even without the addition of plants, water can add greatly to the charm of a garden, by introducing a new and entirely different kind of surface in contrast with that made by plants or masonry, by the reflections which it makes possible, and by the pleasant sound it may make. Nevertheless it is in conjunction with good planting that water gardening can be exploited to the full.

Broadly speaking, water gardens can be divided into two classes, formal and informal. The former were brought to perfection by the Italian garden-makers during the eighteenth and nineteenth centuries. They used water in a number of ingenious ways, not only in the form of lily pools, but also as canals, aqueducts, fountains etc. This subject has been dealt with very fully by Sir George Sitwell in his well-known essay *On the Making of Gardens*. Though many fine formal water gardens are to be found in Great Britain, the tendency in this country, particularly in recent years, has been rather towards the informal garden often produced by damming valleys to form lakes of extremely natural appearance. Small-scale water gardening has been associated particularly with rock-gardens, in the form of pools and cascades. (See also *Pools and Bog Gardens*.)

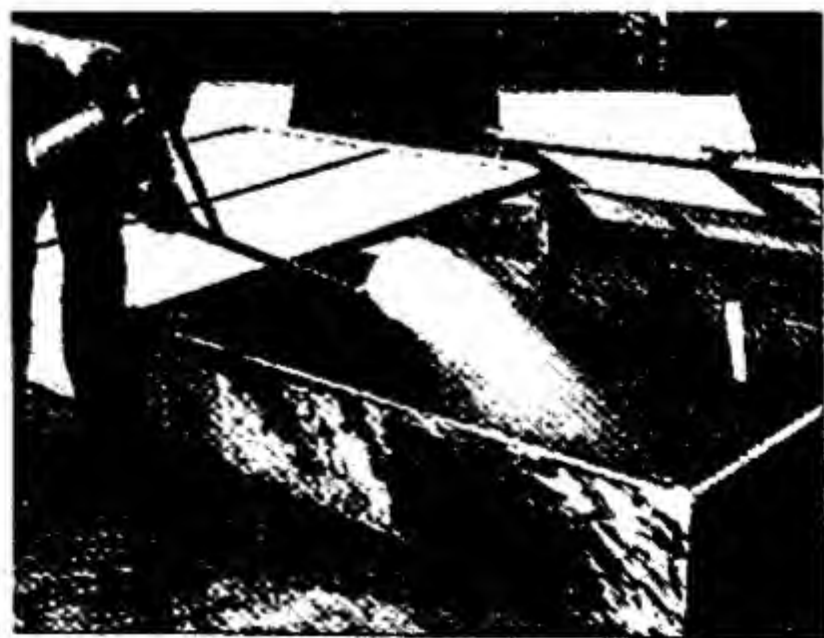
WATERING The correct application of water to plants, and particularly to plants grown under glass, is one of the most important parts of the gardener's art and one of the most difficult to master. Too much water may result in the soil becoming waterlogged, as a result of which air will be driven out of it and the roots of plants will be suffocated. Moreover, over-watering results in chilled soil and retarded growth. On the other hand if insufficient water is applied growth may come to a standstill, for all the nourishment which plants take from the soil must be in solution.

The commonest fault is that of watering too frequently but in insufficient quantity.

As a result the surface inch or so of soil is kept moist most of the time, but beneath this the soil becomes dry. As most of the plant's roots are well below the surface, it follows that growth under such conditions is poor. When watering pot plants it is necessary to give sufficient at each application to moisten the soil right to the bottom of the pot. As a guide to the quantity that will be required the novice should occasionally lift the pot after watering and watch for the first drips of water to appear at the drainage hole. However, this test is valueless if the soil has previously become very dry, as a result of which the ball of soil in the pot has shrunk for then water will run down the cavity between soil and pot and come straight out of the drainage hole. Only when plants have been properly potted in good compost and have been properly watered subsequently, can the test be applied with safety.

Various methods have been suggested for ascertaining whether a plant in a pot requires watering. One of the best is to tap the pot with a cotton reel fastened to a short stick, with a small wooden hammer or the leg-bone of a chicken. If the pot emits a ringing note, the soil within is dry, whereas if a dull thud is the result the soil is moist. This test can only be used with sound pots, for those which are cracked will always give a dull sound no matter how dry the soil. Another test is to lift the pot, for wet soil weighs much more than dry soil.

It is not so easy to advise methods of checking the moisture content of beds or



Watering, using a fine rose

borders. A soil testing auger, a tool rather like an enormous gimlet which when thrust into the ground can be withdrawn carrying a core of soil can be employed, but is usually possessed only by scientists and professional horticultural advisers. Experience is really the only sure guide, but the novice may be advised occasionally to excavate a hole to a depth of a foot or more and, observe the state of the soil at various depths. He may often be astonished by the result and will certainly gain experience in correct watering.

In dealing with greenhouse borders used for vines, tomatoes, etc., it is, as a rule, only possible to replenish subsoil losses during the winter, so much water being required for this purpose that, if applied while plants are in growth, there will be serious danger of injury being done. In consequence it is good practice to run a hose on the border in January or February and give sufficient water to soak down to a depth of 18 inches or 2 feet. Failure to replenish subsoil supplies accounts for many mysterious troubles which occur later in the year, including blossom end rot in tomatoes and poor growth and small foliage in grapes.

The method of applying water must always be considered with care. Most watering cans are fitted with roses, and often with roses of two different kinds, one fine the other coarse. Fine roses should only be used for sprinkling cuttings or other plants that need no more than an overhead damping. This method of watering gives a deceptive appearance of moisture on top. Small pools soon start to collect on the surface yet the soil beneath may be quite dry. Much inadequate watering is due to the frequent use of fine roses. Coarser roses are better, but for all watering of well-established plants the water should be applied direct from the spout of the watering can, held close to the soil to avoid disturbing the surface with a powerful jet of water. When watering outdoors, no rose should be used except for very small plants. The best kind of watering in the open is with an irrigation plant of some kind which can be left to run for an hour or so and will give a rain-like spray.

At one time it was supposed that the



Watering a box of seedlings

temperature of the water used for greenhouse plants was important, and that this must be at least equal to the air temperature of the house in which the plants are growing. Experiments have not confirmed this view and it does not seem that cold water gives plants any severe or prolonged check. Nevertheless common sense would suggest that it is undesirable to use extremely cold water for plants that are growing in a warm atmosphere.

The character of the water is also of importance. Very hard water containing a lot of lime is not suitable for lime-hating plants such as most of the rhododendrons and heathers. Water that contains a great deal of iron can sometimes give trouble and other mineral excesses may also prove to be harmful. There is no doubt that the popularity of certain districts with commercial growers of certain types of plant is often due to a water supply in that locality particularly favourable for that kind of plant.

It is possible to feed plants as they are watered, in fact water itself must be regarded as an important food element. Further plant foods can be added to it either in the form of chemicals, or by steeping bags of manure, soot, etc. in the water. (See *Liquid manure* and *Irrigation*.)

WATTLE Any structure made of interlaced pliable twigs or small branches, which may be either whole or split. Wattle hurdles, which are much used by farmers for penning sheep and other stock, are also sometimes used in the garden as temporary

fences, as supports for plants or as screens for slightly tender plants.

WEED Any plant growing where it is not required. No hard and fast division can be made between weeds and cultivated plants. Thus grass is a weed in a bed or border or on a path but is a highly desirable plant in a lawn. Snow-in-summer (*Cerastium tomentosum*) can be attractive and useful if kept within bounds, but can become a troublesome weed if allowed to spread too freely.

Weeds can be killed mechanically by hoeing, hand weeding, digging, etc. or they may be killed with various chemicals.

When the true definition of a weed is grasped it will be realized how impossible it is to find any chemical which will kill all weeds and spare all cultivated plants.

It may sometimes occur that the removal of the weeds will do more harm than the weeds themselves. This is most likely to be the case if removal necessitates much disturbance of the soil with consequent injury to roots. It is often advised that a covering of weeds should be permitted to grow in orchards from about August to October as this will tend to improve the colour of the fruit and will then supply organic matter which can be dug or ploughed in. It is in any case generally conceded that weeds do most harm to young seedlings and unestablished or small plants and that they are far less damaging, if damaging at all, to larger and more firmly established plants, or to plants which are approaching maturity.

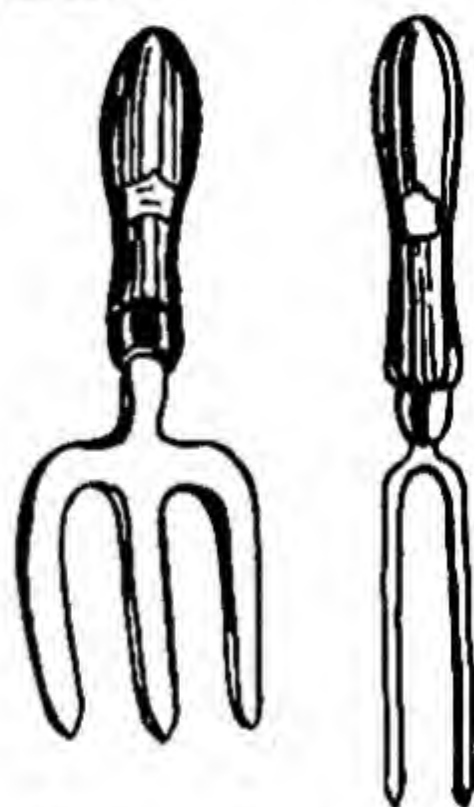
Weeds may be classified as annual and perennial, and, in general, the former are easier to destroy. If they can be prevented from ripening and distributing their seed all trouble will be at an end. Perennial weeds, by contrast, can continue to live and spread for years without ever producing a seed. Most are weakened and killed in time if they are repeatedly cut off at or just below soil level, but some such as goutweed, couch grass, bindweed and horsetail show great resistance even to this treatment. Some annuals will continue to develop and ripen their seeds even after they have been pulled up or cut down. Groundsel is particularly troublesome in this way and so

should always be removed bodily if it is in flower at the time that it is attacked.

Most weeds can be placed on the compost heap to decay and make useful manure but exception should be made in the case of kinds that are known to have great powers of recuperation, for these may continue to grow even after having been in the compost heap for many months. Examples are bindweed, docks, dandelions and creeping buttercups. It is also unwise to place weeds that are seeding on the compost heap, since the seeds are unlikely to be destroyed and will be redistributed with the compost.

WEED FORK A small fork usually with two or at most three prongs and a cranked shaft, which may be used for grubbing out weeds on lawns or in beds.

Weeding forks



WEEDKILLER Various chemicals can be used to kill weeds, but it is important to observe that as a weed has been defined simply as a plant in the wrong place, all weedkillers are liable to damage some plants that are not regarded as weeds. This is true even of the so-called selective weedkillers, i.e. those which, while killing a certain class of plants are harmless or nearly so to others. A familiar and old-fashioned example of a selective weedkiller is lawn sand, usually prepared by mixing 20 parts by weight of ordinary silver sand, with 3 parts by weight of sulphate of ammonia, and 1 part by weight sulphate of iron. This mixture is applied at the rate of

4 ounces per square yard to lawns with the object of killing broad-leaved weeds and stimulating the grass. It relies for its effectiveness on the caustic properties of sulphate of ammonia when it comes directly into contact with foliage. The chemical lodges on the broad leaves of weeds such as plantains and dandelions, but slips off the narrow and more erect blades of grass. In consequence it burns the weeds, but it does not seriously injure the grass. Later on when dissolved by rain it is washed out into the soil and becomes a valuable fertilizer.

Modern examples of selective weedkillers are to be found amongst those substances known as plant hormones or growth-promoting substances. (See *Hormones*.)

Other classes of weedkiller are only very slightly selective or are not selective at all. A familiar example may be found in sodium chlorate, a white crystalline chemical closely allied to common salt. This, when applied dry at the rate of 2 ounces per square yard, or dissolved in water at the rate of 2 to 4 ounces per gallon, will destroy most green plants. It is a valuable weedkiller for use on paths or in other places where a clean sweep of vegetation is required. On cultivated ground it can only be used with safety when all crops have been removed. Subsequently the ground must be allowed to lie fallow for several months so that the chemical may be washed out again. This process can be hastened if the ground is flooded heavily with water.

Common salt (sodium chloride) is itself used as a weedkiller but is not as effective as sodium chlorate (see *Salt*). Both have the merit of being entirely non-poisonous to both human beings and domestic animals. Sodium chlorate is inflammable.

Sulphuric acid is used by farmers as a weedkiller for onion crops (see *Acid*). It is a somewhat unpleasant substance to use because of its generally caustic nature. Even spraying machines with brass or copper working parts are attacked and corroded by the acid. When diluting the acid, it **must** be added to the water and never vice versa.

Calcium cyanamide, a fine dark powder used as a fertilizer, has some value as a weedkiller because it burns foliage in much

the same way as sulphate of ammonia. The method of use is to dust it over the weeds at the rate of 2 to 3 ounces per square yard. Calcium cyanamide supplies both lime and nitrogen to the soil.

White arsenic (arsenious oxide) is a powerful plant poison which may be used as a weedkiller, but unfortunately it is also extremely poisonous to human beings and animals. It has the merit that its effect remains for a considerable time so that the path or other place treated with arsenic is not likely to produce any growth of weeds for a year or more. Proprietary arsenical weedkillers are sold ready for use after mixing with water according to manufacturers' instructions. A recipe which may be followed by those who prefer to mix their own is white arsenic 4 pounds, caustic soda 1 pound, water 2½ pints. This stock paste should be kept closely stoppered until required, when 1 pound of paste should be diluted with 10 gallons of water and the solution applied at the rate of approximately 1 gallon per 10 square yards.

WEeping A term applied to the naturally pendulous habit of some trees and shrubs and also to the practice of training certain plants, including roses, in such a manner that they appear to have a pendulous habit. One of the most familiar examples of a natural weeping habit is to be found in the weeping willow, *Salix babylonica*. There are weeping forms of a great many other trees including common birch, beech, ash, hornbeam and elm. Many conifers also have weeping forms, including *Chamaecyparis Lawsoniana*, the common larch, yew and *Picea excelsa*.

WEEVILS A number of weevils attack plants and some are capable of causing serious damage. The adult insects are, in fact, beetles with a characteristically elongated snout. The larva or grub which precedes the adult weevil is often as damaging or even more so than the weevil itself.

One of the most universal and troublesome of these pests is the vine weevil. The creamy white or pale brown grub may be found in the soil feeding on various roots,

tubers, corms and bulbs. It is particularly fond of begonias and cyclamen. The weevils themselves are black and they are leaf eaters, their characteristic irregular rather ragged-looking holes often being seen in the leaves of neglected vines.

Nearly allied to this is the clay-coloured weevil, the whitish larvae of which are especially fond of the roots of roses though they will also attack many other plants. The weevils themselves are ashen grey.

The pea-and-bean weevil attacks both peas and broad beans and eats its way right round the edge of each leaf giving it a distinctive scalloped appearance. Seedlings are particularly likely to be attacked and may be considerably weakened by the loss of leaf area.

Fruit growers are familiar with the apple blossom weevil. The adult is dark-coloured with a grey V on the wing cases and it feeds on apple (occasionally pear) leaves. More serious damage is done by the small white grub which feeds within the blossom bud before it opens with the result that the bud turns brown and remains shut. Such blossoms are said to be 'capped' and as they are completely destroyed no fruit can be obtained from them. In severe cases the whole of the blossom may be attacked in this way and the crop for that year completely lost.

All weevils are extremely vulnerable to DDT and this provides the best remedy for

them. It can be applied as a spray or as a dust. When dealing with apple blossom the period at which DDT can be used effectively is rather restricted, the best time usually being the first fortnight in March. For other weevils DDT should be applied as soon as an attack is seen to be developing. With those species which attack the roots of pot plants, repotting is generally the only remedy, coupled with a careful search for the larvae.

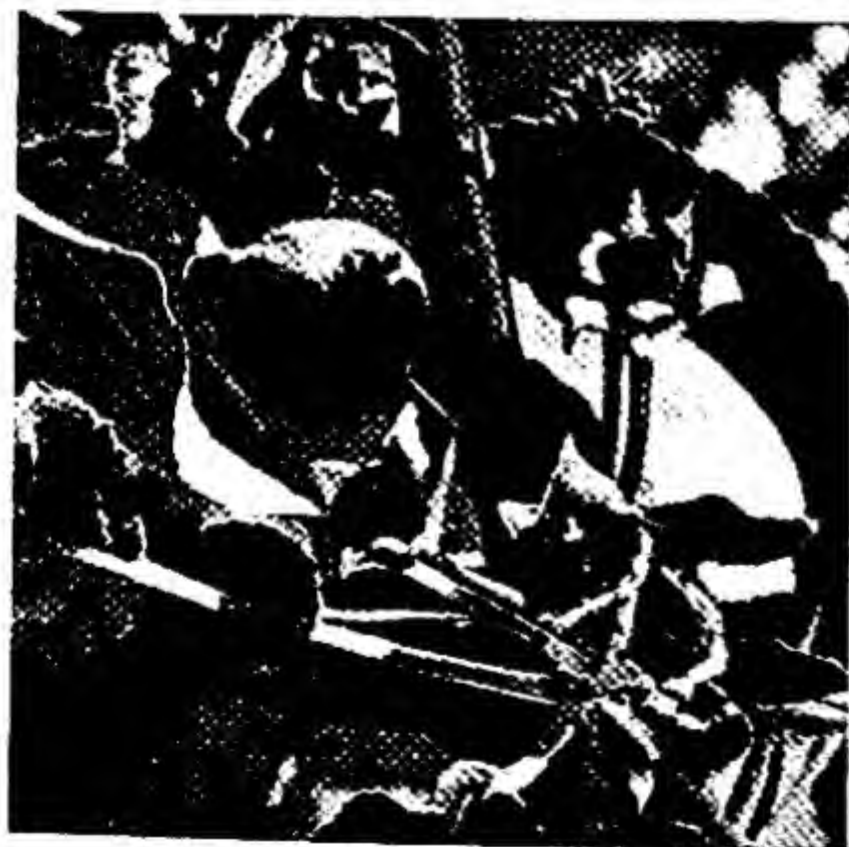
WHEELBARROW The old-fashioned wooden wheelbarrow with its single wheel and two handles has to some extent been supplanted by modern developments, mostly in the form of metal wheelbarrows with rubber-tyred wheels. These have the advantage of being more durable and easier to push, particularly over rough ground. As a rule solid rubber tyres are employed, but occasionally the tyres are pneumatic. Other developments are barrows with twin wheels, which are easier to balance when filled with a heavy load but cannot be tipped so readily, and wheelbarrows with caterpillar wheels which are claimed to be particularly effective on irregular or soft ground. To overcome the tipping difficulty when two wheels are employed, some models are fitted with a tipping body hinged to the main framework.

WHETSTONE Any stone used for sharpening knives, scythes, sickles and similar cutting tools. (See *Sharpening*.)

WHIP GRAFT A particular kind of graft much used by fruit growers when working young stocks. (See *Graft*.)

WHITE BUD, see *Bud Stages*.

WHITE FLY Tiny white winged insects which sometimes infest tomatoes in such numbers that, if disturbed, the 'flies' appear in a dense white cloud. They are by no means confined to the tomato though they are particularly fond of this plant. Many greenhouse plants are attacked and there are allied though slightly different white flies which attack plants outdoors, notably



Blossoms capped by apple blossom weevil

cabbages and other members of the brassica family.

In addition to the flies themselves damage is done by the 'scales' which precede the adult stage and are attached like minute limpets to the lower surface of the leaf. Sap is sucked from the leaves and they are fouled with a sticky grey excrement which blocks up the breathing pores (stomata) in the leaves and prevents them from functioning properly. Though plants are seldom killed by white fly they are often severely weakened.

Under glass the most effective method of destroying white flies is by fumigation with calcium cyanide but this is an extremely poisonous chemical and must be used with great care. An alternative is to fumigate with tetrachlorethane which, while also poisonous, is not as dangerous as calcium cyanide.

A small wasp-like insect, known as *Encarsia formosa*, preys upon the 'scales' and, if introduced to a greenhouse in which there is a heavy infestation, will soon reduce it very considerably. Scales that have been attacked by this parasite have a distinctive dark appearance and contain the eggs of the parasite. If a leaf bearing scales of this kind is hung up in a greenhouse containing white fly, the parasite will be produced from the eggs and will multiply rapidly. This useful parasite is killed by fumigation with calcium cyanide or tetrachlorethane and also by cool temperatures so it cannot be overwintered in an unheated greenhouse.

Outdoors fumigation is useless as a means of controlling white fly, but a fair measure of success can be obtained by occasionally spraying with DDT.

WHITE ROT A disease of onions and allied plants including leeks, shallots and garlic. It is caused by a fungus which may be carried in the soil. Leaves of attacked plants become yellow and limp and roots die so that the whole plant can be pulled up very easily. Fluffy white tufts of mould appear on the bulbs and it is this feature which has occasioned the popular name. Where the disease has occurred it is desirable to give the ground a change of crop

for a few years to starve the fungus out. The soil can be sterilized with formalin (see *Sterilization*) but this is usually too expensive a remedy to be practical in the open. In any case it can only be carried out when all plants have been removed from the ground. Some varieties of onion are much more resistant to the disease than others and it is desirable to grow these if the disease has proved troublesome. Among the resistant varieties are Rousham Park Hero, White Spanish, Improved Reading and Up-to-Date.

WHITE RUST A disease of brassicas and certain allied plants including stocks, wallflowers and the common weed, shepherd's purse. It is caused by a fungus, and a dense white outgrowth, rather like felt in appearance, occurs on the stems and leaves of attacked plants. Growth may be crippled as a result. Occasional spraying during the summer months with colloidal sulphur will prevent the spread of the disease but it is also very desirable to keep down all cruciferous weeds and particularly shepherd's purse.

WHORL A botanical term used to describe the arrangement of several leaves or flowers in the form of a circle at one joint or



Leaves arranged in a whorl

node on a stem. The flowers of *Primula japonica* are borne in whorls.

WILD GARDEN A term applied to certain kinds of planting in which an attempt is made to simulate nature. Thus a few ornamental trees or shrubs may be added to a natural woodland or the ground beneath the trees may be planted with foxgloves or primroses in irregular drifts. Natural planting of this kind can be most effective. Great care must be taken to use only those kinds of plants which will be able to fend for themselves against considerable competition, for if too much cultivation is required to keep the plants alive, the natural effect is bound to be lost. As a rule the surface soil in a wild garden cannot be cultivated to any great extent, though it may be possible to cut down grass and unwanted weeds from time to time with a scythe or swaphook and so prevent them from choking less vigorous plants which have been introduced by the gardener. A woodland garden may simply be regarded as a particular form of wild garden.

WILT The general name 'wilt' is given to several quite unrelated diseases which are alike in causing a sudden flagging of the leaves of plants while they are in full growth. Of course wilting may also be caused by dryness or by loss of roots due to insect attack or other causes. Brassica plants which have been attacked by cabbage root fly usually wilt severely and this may be the first indication the gardener gets that something is wrong. Excessive watering or rainfall may also cause wilting by bringing about the death of roots by suffocation.

The three diseases that are usually known by the name 'wilt' are Aster Wilt, Sleepy Disease and Spotted Wilt. Aster Wilt is confined to annual asters (*callistephus*). It is caused by a fungus which attacks the stem near soil level causing it to decay and turn black. There is no cure, but resistant strains of aster have been raised. The fungus is carried in the soil but can be killed by soil sterilization with steam or formalin.

Sleepy disease or wilt is common in tomatoes and is also found in cucumbers,

melons, potatoes, sweet peas, perennial asters and some other plants. Like aster wilt it is caused by a soil borne fungus, or rather fungi, for it is not the same organism that is responsible in each case. Usually there is brown staining of the interior woody tissues of the stem. Little can be done to check the disease once it occurs and affected plants are best burned. Soil in which they have been growing should be sterilized with steam or formalin.

Spotted wilt occurs in tomatoes and many other greenhouse plants including arum lilies, cinerarias and gloxinias. It is caused by a virus and a distinctive feature is the appearance on the leaves of tiny circular rings which rapidly increase in size. The growing point of the plant often has a bronzed appearance, many leaves curve downwards and the plant becomes stunted and eventually dies. There is no cure and affected plants should be burned. As infection is spread by thrips and also on pruning knives etc. the former should be destroyed by fumigation or spraying and the latter should be sterilized with lysol.

WIND Moving air can have a considerable influence upon the behaviour of plants, particularly if it is moving at such a velocity as to constitute a strong wind or gale. The influence may be in one of two ways, either direct disturbance of the plant, which, in severe form, may result in the roots of the plants being dragged bodily out of the soil, or an increase in the rate at which water is lost from the leaves by surface evaporation. The former needs little comment as the results are obvious, but damage of the latter kind may often be puzzling and be attributed to causes other than wind. Familiar symptoms are browning of leaf margins or a mottled browning of the whole leaf, and such markings may easily be mistaken for those caused by disease. Sharp draughts in greenhouses or frames will cause precisely the same symptoms, particularly on the tender young leaves of such plants as tomatoes or grape vines. Almost precisely similar damage can be caused under glass by sun scorch, and it is sometimes difficult to decide whether a

particular outbreak of scorching is, in fact, due to strong sunshine or to draughts.

Outdoors, wind damage causing leaf scorching may be confused with damage caused by frost, and it is not possible to give any general rules by which one kind of damage may be distinguished from the other. The atmospheric conditions which have been prevailing during the few days before the damage is observed will usually give the clue. Some plants which are highly resistant to wind damage are extremely sensitive to frost damage and vice versa. A good example of the former can be found in *Senecio rotundifolius*, which in some very exposed gardens in Cornwall is used as an outer windbreak against Atlantic gales in positions in which few other evergreens would survive, yet is killed by temperatures of a few degrees below freezing point. (See *Protection*.)

WINDOW BOXES Boxes or containers specially made to be placed on window ledges or to be suspended from such ledges, and to contain living plants. With the passing of the sash window frame and the advent of the casement type of window, the window box has tended to disappear, since it is obviously not as easy to devise a box for casement windows which must open outwards as for sash windows which are moved vertically. One way in which this difficulty can be overcome is by hanging the box a few inches below the level of the window ledge and by planting it entirely with trailing or low-growing plants. Window boxes can also be used in many places that could not be strictly described as windows, e.g. on the tops of porticos and on verandas.

Well-managed boxes can add greatly to the effectiveness of most buildings. They may be permanently planted with small evergreen shrubs and hardy perennials, or filled with temporary plants such as spring and summer bedding plants, including bulbs of many kinds. One very convenient method of ensuring a succession of flowers in window boxes is to prepare containers that will fit exactly in each box, and to have two or three containers for every box. These containers are filled with soil and

suitable plants, and placed in a frame or greenhouse from which they can be removed to the window box when the plants are about to flower.

Whatever method is used, plants should be grown in a normal potting compost such as the John Innes compost (*q.v.*) Window boxes and any containers made for them must be provided with holes through which surplus moisture can drain. The only exception to these rules is with window boxes which are treated according to the soilless culture method. These need no outlet for moisture and the boxes or containers are filled with non-nutritive aggregate such as sand, gravel, washed clinkers or vermiculite (see *Soilless Cultivation*). Details of cultivation for plants in window boxes are the same as for those in other places.

Choice of plants for window boxes must be conditioned to a large extent by the aspect of the box and the kind of atmosphere in which the plants will grow. Thus for a sunny window zonal pelargoniums, ivy-leaved pelargoniums, heliotropes, marguerites, lobelias, tropaeolums, gazanias, mesembryanthemums, stocks, zinnias, and sweet alyssum may be used. For north or east window boxes it will be necessary to choose plants which will thrive with little or no sunshine. Violas, pansies, bedding calceolarias, asters and fuchsias may succeed in such places, also the trailing *Campanula isophylla* and foliage plants such as *Glechoma hederacea variegata* and *Zebrina pendula*.

Plants growing in potting compost in window boxes will need to be watered frequently, particularly during the summer months. During sunny weather it may even be necessary to water south-facing boxes twice a day.

WIND POLLINATION In many plants pollen is transferred from the anthers to the stigmas of the flowers by insects, but in some it is carried by wind only, and such plants are said to be wind-pollinated. Most of the catkin-bearing trees are of this type as for example, hazel and alder. It is probable that even with insect-pollinated flowers, such as those of fruit trees, wind is also an important agency for effecting pol-

ination. Without pollination no fruit or seed can, as a rule, be produced.

WINDBREAK, see *Windscreen*.

WINDSCREEN Any protection provided specifically against wind. It may take the form of a wall, fence, hedge or belt of trees. (See *Wind*.)

WINTER GARDEN A large conservatory or greenhouse in which plants are grown in beds or borders with paths between, the effect being that of a garden under glass.

WINTER MOTHS Three species of moth, the Winter Moth, the Mottled Umber, and the March Moth are known as 'winter moths' because they lay their eggs in winter (March in the case of the March Moth). The eggs are laid on fruit trees, principally apples, and the caterpillars hatch out just as the trees break into leaf in the spring. The result of a severe attack may be the complete loss of the leaves and this inflicts a very severe check on the trees.

There are three main lines of attacking these pests. First the moths themselves may be trapped by means of greasebands (*q.v.*).

A second line of attack is to spray the trees with tar oil winter wash, DNC wash or some other approved winter wash, between December and early March, with the object of destroying the caterpillar eggs. The later in the winter this can be applied the more likely it is to kill the eggs, but unfortunately the more likely it is to cause scorching of the fruit trees buds and young growth. In general tar oil washes are applied in January and DNC washes the last week in February or first in March.

A third line of attack is to spray with DDT or gamma-BHC at the green-bud and pink-bud stages (about mid-April). It is undesirable to apply DDT to fruit trees after April as it may destroy many of the natural enemies of the fruit tree red spider and so cause a serious increase of this pest.

WINTER WASH Any insecticide or fungicide primarily intended to be applied during winter when plants are dormant.

The name is particularly used for various insecticides derived from tar oil and petroleum and used in the main on fruit trees with the purpose of killing insects and insect eggs and cleaning the bark of lichen, algae and other unwanted growths. Winter washes of this kind form an important part of the spray routine in the fruit garden, for by their use trees can be given a comparatively clean start in spring. Nevertheless tar oil and petroleum winter washes have little or no effect on fungi nor do they affect those pests which attack the trees during the spring and summer but are not on them in the winter. For further particulars regarding the application of these sprays, see *Tar Oil Winter Wash* and *Petroleum Oil Insecticides*.

WIRE STEM A name applied to a particular type of foot rot or damping-off disease which attacks brassica seedlings and causes the stems to shrivel and turn brown. Affected plants should be burned.



Wire stem of cabbage contrasted with healthy seedling

WIRE WORMS The larvae of certain beetles found in the soil and popularly known as 'click' beetles because some of them make a clicking noise with their wings.

The beetles are brown, active and about half an inch in length. The wireworms are yellow, shiny and hard skinned, very slow in their movements, with segmented bodies and three pairs of legs near the head. They may be anything from a third of an inch to nearly an inch in length. Centipedes are sometimes mistaken for wireworms as they are also yellow, shiny and hard skinned, but they have a much greater number of legs and are very active.

Wireworms live in the soil and eat the roots of many different plants. They frequently bore into potatoes making numerous narrow holes and they may also attack fleshy seeds such as those of peas or beans. Attack is likely to be most severe on newly broken grassland and damage frequently reaches its climax the second year after the grass is turned in. As a rule wireworms tend to disappear with continued and thorough cultivation. Finely powdered naphthalene forked into vacant ground at 4 ounces per square yard or round growing crops at 2 ounces per square yard will lessen damage but will not entirely eliminate wireworms. This can be done by forking in gamma-BHC at 2 ounces per square yard, preferably in early autumn but this substance may sometimes impart a musty flavour to root crops, particularly if it is not very pure or is applied too close to planting time. Wireworms can also be trapped by burying sliced potatoes or carrots just below the surface of the soil. If these traps are impaled on sharpened sticks which are left projecting from the soil it will be easy to collect them every day or so and destroy any wireworms they may have attracted.

WITCHES' BROOM Twiggy outgrowths sometimes found on trees and caused by a local irritation of the living tissue of the tree, which may be due to gall insects or a fungal infection. These curious growths are particularly common on birch trees though they may be found on all manner of trees, including conifers. When the witches' broom is caused by fungus infection it will often be found that cuttings or grafts prepared from the affected shoots will continue to behave in the same curious manner and it is in this way that some of the dwarf or

congested forms of familiar trees have been obtained.



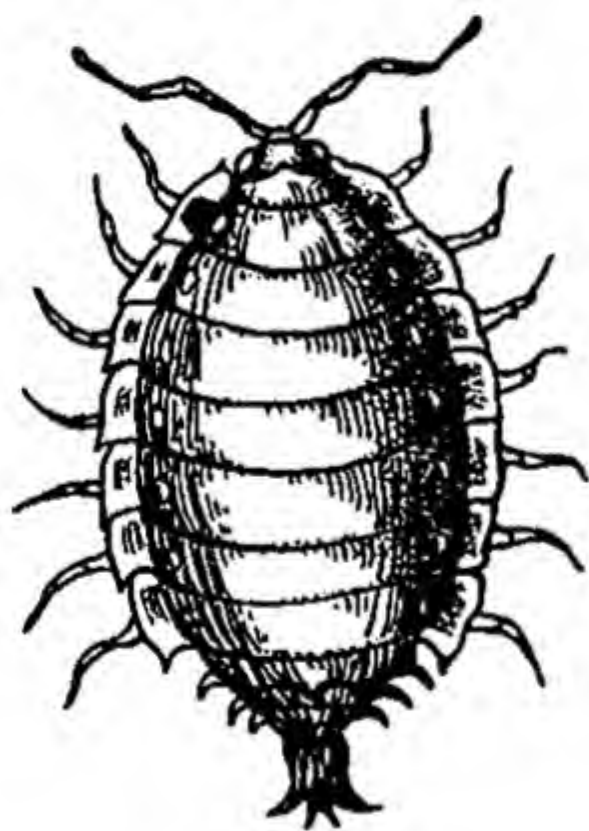
Witches' broom on Douglas fir

WOOD ASH The ash obtained by burning wood is a valuable garden fertilizer because of the potash which it contains in the form of carbonate of potash. As this is a soluble chemical it will be washed out of the wood ashes fairly quickly if they are exposed to rain. For this reason wood ash should be stored in a dry place. It can be used at any time of the year either as a top dressing or worked into the soil at the rate of about 8 ounces per square yard. A good sample of wood ash may contain as much as 7 per cent. potash. The best quality wood ash is obtained from a rather slow-burning fire.

WOODLAND GARDEN A natural woodland has certain advantages as a site for a garden and also certain limitations. If carefully planted with suitable undergrowth, it may be made almost entirely self-supporting and require very little attention beyond the occasional cutting down of coarse growth and weeds. Nevertheless, because of the shade and the competition of tree roots, the range of plants that can be grown successfully is limited. Rhododendrons and azaleas thrive well under these conditions provided the shade is not too dense. Many other shrubs and shade-loving perennials can also be established successfully. Some examples are evening primrose (*Oenothera biennis*), common foxglove (*Digitalis purpurea*) verbas-

cums, some of the taller campanulas and notably *Campanula lactiflora*, many lilies, the willow gentian (*Gentiana asclepiadea*), hellebores, including *Helleborus orientalis* and *Helleborus corsicus*, primroses, wood anemones such as *Anemone nemorosa* and its varieties, hepaticas, epimediums, lythrums, lysimachia and several of the hardy geraniums. Amongst shrubs, camellias are useful provided the shade is not too dense and many vacciniums and gaultherias can also be grown in non-calcareous soil. All manner of bulbs can also be planted including wood lilies (*trillium*), bluebells and daffodils. The planting of the woodland garden should always be on natural lines with paths winding amongst irregular groups of shrubs and plants.

WOODLICE These familiar grey or blackish, hard-coated creatures, which roll themselves into a ball when disturbed, can be troublesome in the greenhouse, though they seldom do any serious damage out-



Woodlice

doors. In the main they live on decaying wood and other refuse and may be regarded as scavengers but they are also quite capable of turning their attention to soft-stemmed plants and in particular to very small and tender seedlings which they will sometimes mow off at soil level. Woodlice have various names in different parts of country, slaters and pillbugs being two of the commonest.

Poison baits provide the best means of destroying them though they may also be trapped in flower pots stuffed with straw or hay and either inverted or laid on their sides, or in scooped-out potatoes placed on the soil. Two useful poison baits are 4 ounces of Paris green mixed with 7 pounds of slightly moistened bran, or 4 ounces of Paris green mixed with 7 pounds of dried blood. Using either of these, the bait should be placed in small heaps where the woodlice congregate. Decaying refuse should be burned or placed on the compost heap.

WOOLLY APHIS A species of aphid common on apple trees. It attacks the wood, often destroying buds in the process, causing gouty-looking swellings and cracks which may later develop canker. The most distinctive feature of the pest is the white, wool-like excretion with which it covers itself. A badly attacked tree may look as if it had been plastered with small wads of cotton wool. Incidentally this covering acts



An apple shoot attacked by woolly aphid

as an efficient protection to the insect and unless sprays are applied with great force or insecticides are worked right into the woolly patches with a stiff brush, they may be quite ineffective. Tar oil wash may be applied in early January or nicotine or HETP at any time during the summer. Methylated spirit or paraffin may be brushed directly into the woolly patches but care should be taken to keep these substances off the leaves. There is also a form of woolly aphis which lives on the roots of the trees, though this seldom, if ever, occurs in this country. If it should be encountered, soil fumigation with carbon disulphide is the most effective remedy.

WORMS, see *Earthworms*.

ZINC COLLARS Strips of zinc of any convenient length and about 2 inches in

breadth, are sometimes placed in the form of collars round the bases of plants that are liable to be attacked by slugs, the idea being that the slugs will not readily scale such barriers to reach the plants within. The base of each collar should be placed firmly on the soil and care should be taken to see that the two ends of the collar meet closely.

ZINEB A fungicide which is principally used against potato blight and scab of apples and pears.

ZIRAM The popular name of zinc dimethyl dithiocarbonate, a chemical much used in America as a fungicide. It leaves no unsightly residue as does Ferbam (*q.v.*) but does not appear to be quite so effective in the control of rose black spot disease. Ziram has not found much favour in Britain.

